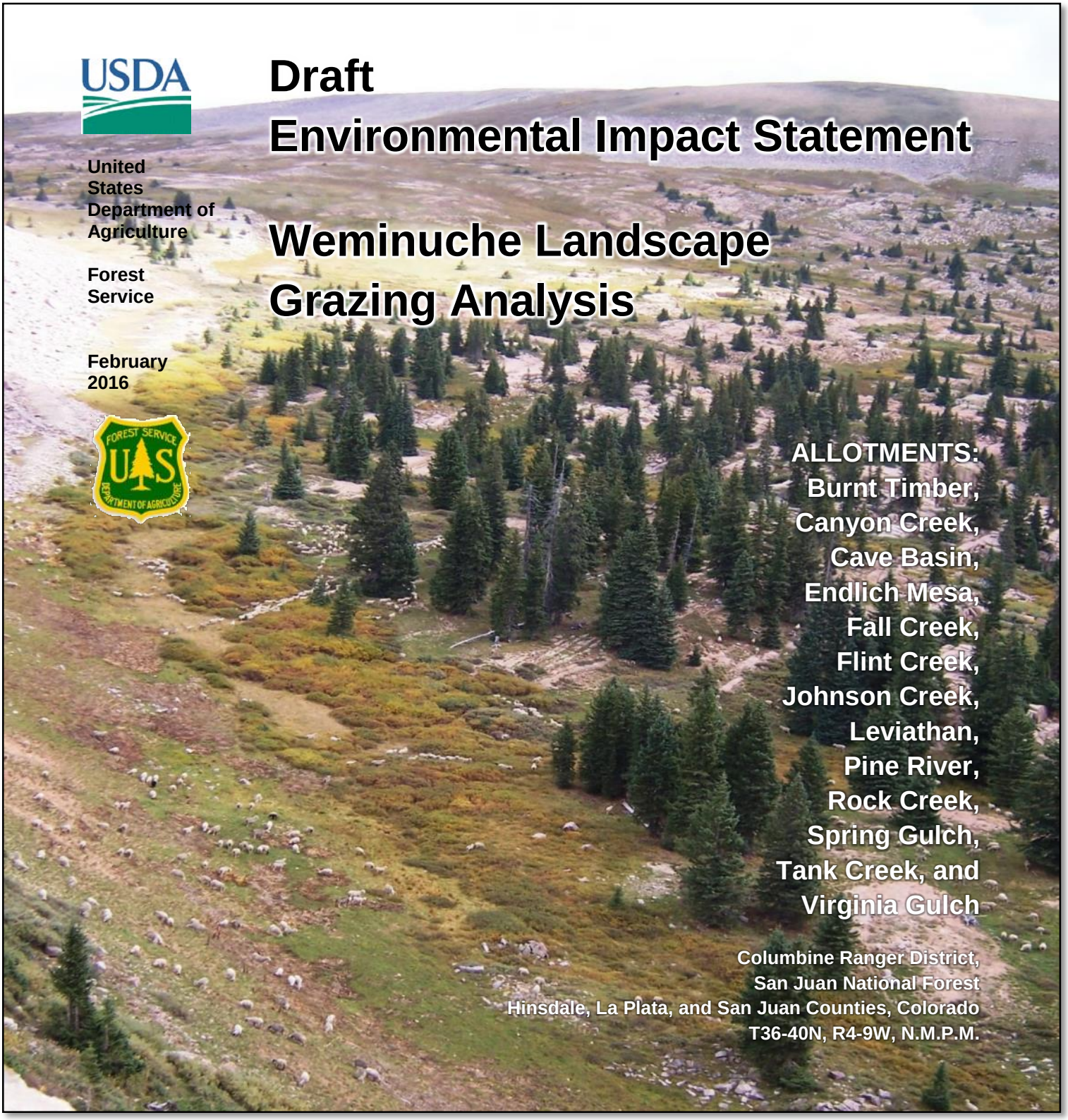

Draft Environmental Impact Statement

Weminuche Landscape Grazing Analysis

United States Department of Agriculture

Forest Service

February 2016

ALLOTMENTS:
Burnt Timber,
Canyon Creek,
Cave Basin,
Endlich Mesa,
Fall Creek,
Flint Creek,
Johnson Creek,
Leviathan,
Pine River,
Rock Creek,
Spring Gulch,
Tank Creek, and
Virginia Gulch

Columbine Ranger District,
San Juan National Forest
Hinsdale, La Plata, and San Juan Counties, Colorado
T36-40N, R4-9W, N.M.P.M.

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Weminuche Landscape Grazing Analysis
Draft Environmental Impact Statement
Hinsdale, La Plata, and San Juan Counties, Colorado

Lead Agency: **USDA Forest Service**

Responsible Official: **Matthew Janowiak, Columbine District Ranger**
P.O. Box 439, Bayfield, CO 81122

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ABSTRACT

This draft environmental impact statement presents analysis of impacts from permitted term livestock grazing in the Weminuche Landscape under four alternatives: No Grazing, Current Management, Adaptive Management/Forage Reserves, and the Preferred Alternative of Adaptive Management/Vacant Allotments with Restocking Requirements. Foremost issues concerning domestic sheep grazing include impacts to watersheds, bighorn sheep, and the wilderness recreational experience.

Reviewers should provide the Forest Service with their comments during the review period of the draft environmental impact statement. This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decision making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act (NEPA) process so that it is meaningful and alerts the agency to the reviewers' position and contentions. Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the final environmental impact statement. Comments on the draft environmental impact statement should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (*40 CFR 1503.3*).

This project falls under new objections regulations at 36 CFR 218, subparts A and B. In order to object to the upcoming decision that will result from this analysis, a person must have previously submitted timely, specific written comments during the public comment periods. Comments received in response to this document, including names and addresses of those who comment, will be considered part of the public record and will be available for public inspection.

Send Comments to: **Matt Janowiak**
Columbine District Ranger
P.O. Box 439,
Bayfield, CO 81122
comments-rocky-mountain-san-juan-columbine@fs.fed.us

Date Comments Must Be Received: **April 4, 2016**

SUMMARY

The Columbine Ranger District, San Juan National Forest, proposes to administer term livestock grazing on all or portions of the Weminuche Landscape in such a manner that will meet or move resource conditions toward desired conditions, and be consistent with the Forest Plan direction, including standards and guidelines.

The analysis area encompasses approximately 166,628 acres on six active allotments, seven vacant sheep allotments, and a small portion of the previously closed Needles Mountains Allotment (*SJNF 2009*). The area is located northeast of Durango, Colorado, in Hinsdale, La Plata, and San Juan Counties, in Townships 36-40 North, Ranges 4-9 West, N.M.P.M. and is within the Columbine Ranger District, San Juan National Forest, Colorado.

Scoping has revealed five key issue topics relating to livestock grazing on the landscape: 1.) Soil/Water Impacts., 2.) Vegetation Impacts. 3.) Recreational Experience Impacts, 4.) Wildlife Impacts, and 5.) Socio-Economic Impacts.

These issues led the agency to develop four alternatives:

- Alt. 1: No Term Livestock Grazing
- Alt. 2: Current Management
- Alt. 3: Adaptive Management / Forage Reserves
- Alt. 4: (Preferred Alternative) Adaptive Management /Vacant Allot.s w/Restocking Requirements

The Preferred Alternative, or proposed action, is to continue to permit term livestock grazing on the active allotments by incorporating adaptive management strategies that would allow the lands to meet or move towards meeting Forest Plan desired conditions. The proposal also includes some minor boundary adjustments to the active allotments to eliminate all overlap between allotments and bighorn core herd home range, and to match topographic features on the ground. Some portions of some allotments would also be authorized for potential future conversion from sheep to cattle. The seven vacant sheep allotments would remain vacant with specific restocking requirements, and no forage reserve allotments would be authorized. The Preferred Alternative is designed to increase the flexibility of livestock grazing systems through adaptive management, which will allow quicker and more effective response to problem areas when they are revealed. Problems will be revealed through the use of short- and long-term monitoring. Application of adaptive management practices should result in improved soil, watershed, and vegetative conditions, and healthier wildlife populations.

Major conclusions are that, while the landscape is generally in good condition, most natural resources including water quality, vegetation and soils, recreation, wildlife, and cultural resources, would benefit most from Alternative 1, then Alternative 4, next Alternative 3. Alternative 2 would be the least desirable. Alternative 1 would be of greatest benefit to natural resources, but would have negative socio-economic impacts. Alternatives 3 and 4 include Design Criteria specifically designed to address issues regarding bighorn sheep and certain areas of recreational conflict. Alternative 4 would allow more protection for bighorn sheep but would also reduce the flexibility that forage reserve would provide.

Based upon the effects of the alternatives, the responsible official will decide whether livestock grazing will proceed as proposed, as modified, or not at all; on all or part of the Weminuche Landscape; and what activities, monitoring, and mitigation will be implemented if grazing proceeds.

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CHAPTER 1 – INTRODUCTION

1.1 ANALYSIS AREA

The Weminuche Landscape is located northeast of Durango and is within T36-40N, R4-9W, N.M.P.M on the Columbine Ranger District, San Juan National Forest (SJNF), Hinsdale, La Plata, and San Juan Counties, Colorado. The analysis area is approximately 166,628 acres in size. Approximately 162,573 acres of the analysis area (98%) are on National Forest System lands. The remaining 4,055 acres are split out between Durango Reservoir Grant lands (City Reservoir) at 2,962 acres, and private lands at 1,067 acres within the boundaries of the National Forest. The Weminuche Wilderness covers 85% of the analysis area. The remaining 15% is on non-wilderness lands. See Figure 1-1.

The majority of the project area is located just west and south of the Continental Divide, in extremely rugged and colorful volcanic mountains, with elevations ranging from approximately 7,200 feet to 14,100 feet. The Florida and Pine Rivers and Vallecito Creek have their headwaters in the project area. The project area is principally alpine tundra, mountain grasslands, and spruce-fir forest. There are smaller areas of aspen, mixed conifer, ponderosa pine, and mountain shrub communities. Cirques and talus-covered slopes, along with numerous streams, fens, and lakes add diversity to the rugged landscape.

The allotments included in this analysis are: Burnt Timber, Canyon Creek, Cave Basin, Endlich Mesa, Fall Creek, Flint Creek, Johnson Creek, Leviathan, Pine River, Rock Creek, Spring Gulch, Tank Creek, and Virginia Gulch Allotments.

Various sections of roads and trails may be used for trailing livestock to reach the grazing allotments in this landscape; some trailing routes are outside the analysis area project boundary, and have been included in this analysis. The trailing routes include the following:

- U.S. Highway 160,
- County Roads: 151, 172, 240, 243, 318, 319, 501, 502, 521, 523, 527,
- Forest Roads: 076 (Red Rim 2), 081 (Lime Mesa), 595 (Red Rim), 597 (Endlich Mesa), 602 (Pine River), 682 (Missionary Ridge), 724 (Middle Mountain), 775 (Saul's Creek),
- Trail segments of: Pine River Trail 523, Vallecito Creek Trail 529, Cave Basin Trail 530, Young's Canyon Trail 546, and Lime Mesa Trail 676,
- A right of way across MacDonald Becket Family Trust properties, and its successors, for access to Canyon Creek Allotment and other cattle allotments.

Figure 1-2 displays the trailing routes to the analysis area, relative to their location in proximity to Bayfield.

Figure 1-1. Project Analysis Area

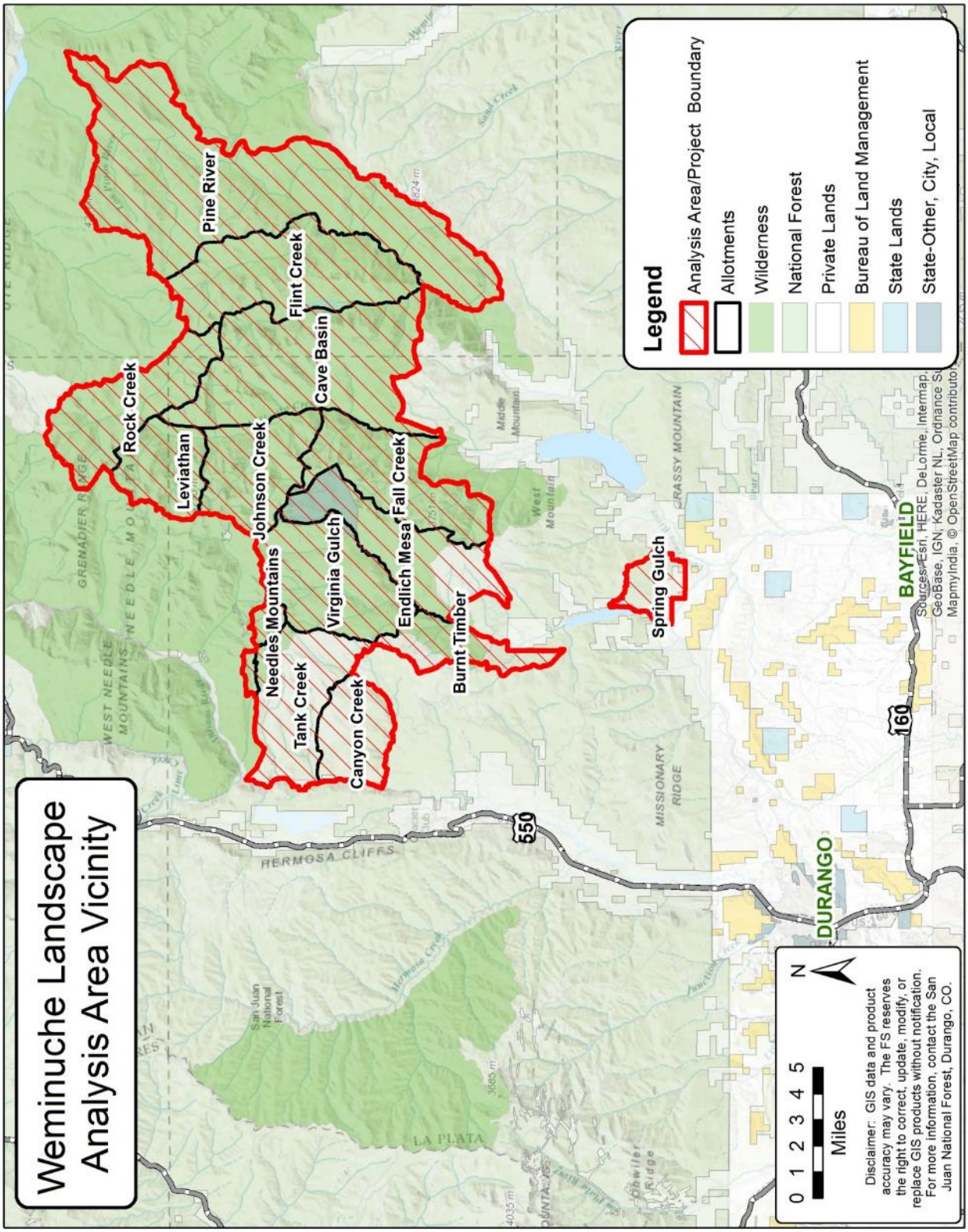
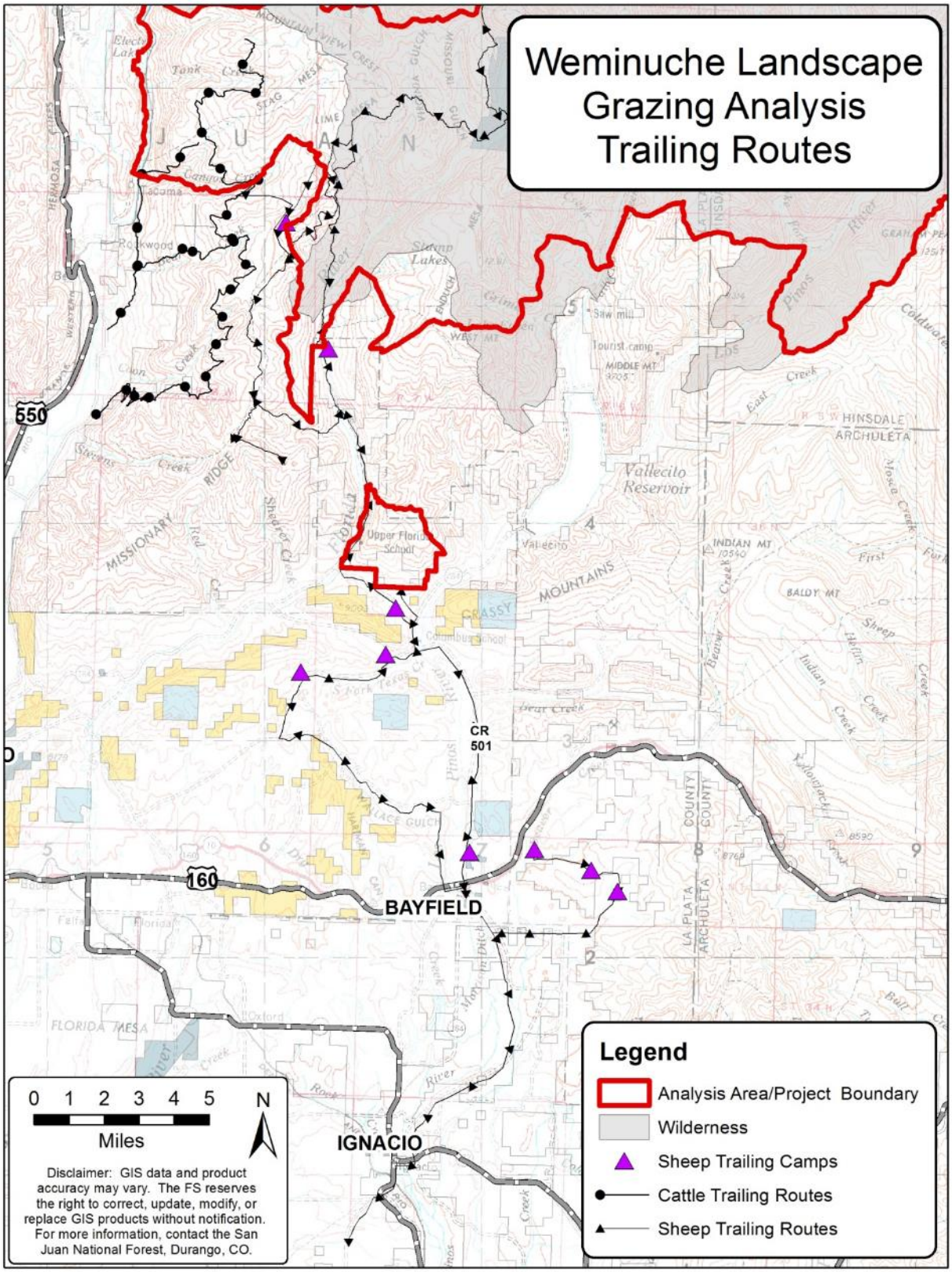


Figure 1-2. Trailing Routes



1.2 BACKGROUND

Livestock grazing is just one of many activities that occur on the Weminuche Landscape. The project area has increasingly become a destination for recreation. Primary recreation activities include hiking and backpacking, viewing wildlife, fishing, snowmobiling, and backcountry skiing. There are two developed Forest Service (FS) campgrounds and several trailheads in the landscape. The Continental Divide Trail passes through the landscape. A major portion of the landscape is in the Weminuche Wilderness.

This area has a long history of sheep and cattle grazing; there are currently six active and seven vacant sheep grazing allotments in the analysis area. Prior to the establishment of the San Juan Forest Reserve in 1905, the San Juan Mountains were used as summer range by large bands of domestic sheep from both Colorado and New Mexico, with the first bands of sheep arriving in the Bayfield/Durango area in 1882 (*Scott 1932*). It is estimated that by 1902, there were approximately 268,000 sheep in the San Juan Mountains. Sheep grazing was generally confined to the higher elevation range above 10,000 feet (*DuBois 1903*). Livestock grazing was unregulated prior to the establishment of Forest Reserves, with season of use based on weather and vegetative development. Generally, sheep would begin slowly working their way up into the high country in May or June, eventually arriving on the highest elevation summer ranges in early July. They started to leave the high country sometime between September 15 and October 1 (*DuBois 1903*).

At this time (1903), there was no division of allotments, so range was grazed on a first-come-first-serve basis, with some areas grazed multiple times in a season. Sheep were usually herded close together, which made it easier for herders to keep watch over the flocks and prevent individual animals from wandering. These large, close-herded bands were constantly moving ahead into fresh grazing, which caused damage to forage from close cropping and trampling. Bed grounds that were used for long periods of time, or that were used season after season, also became denuded and trampled (*Roberts 1963*). DuBois reported that large numbers of sheep prior to 1903 had already left definite trails through some alpine areas, especially in topographic constrictions (narrow, steep or rocky terrain). Sheep also caused damage to previously well-defined trails by widening the trails, causing braiding of the trails and making the actual trail difficult to locate (*DuBois 1903*).

Following the establishment of the San Juan Forest Reserve in 1905, many changes in management were implemented in an effort to properly manage the rangeland resource. Some of the noteworthy changes included dividing the sheep range into distinct grazing districts (allotments) and assigning these areas to specific permittees with designated numbers and seasons of use, including the designation of specific trailing areas to be used to access the allotments. Other important management changes implemented during this time included the adoption of open herding, which allowed sheep to spread out and graze with a minimum of driving, which resulted in less overgrazing and less trampling. Use of bed grounds was also restricted to no more than three nights in one place in order to reduce adverse impacts to soils and vegetation.

Although it is difficult to precisely track historic sheep stocking rates, because of frequently-changing allotment boundaries and dates of use, a search of historic records gives a general picture of the early days of regulated grazing on the San Juan National Forest. The earliest grazing reports located were from the Annual Grazing Report for the San Juan National Forest, 1908, and show 109,359 sheep and goats authorized to graze on the San Juan National Forest in the area now covered by the Columbine and Pagosa Districts. Historic records show the highest stocking of

domestic sheep and goats in that same area to be approximately 198,400 in 1920. From that period on, there were steady declines in stocking. By 1940, there were roughly 104,000 sheep.

By 2013, on the whole Columbine Ranger District, there were nine active sheep allotments permitted for 6,100 sheep, two sheep forage reserves allotments, and another seven vacant sheep allotments. On the Weminuche Landscape, relevant to this environmental document, there are currently three active sheep allotments (Endlich Mesa, Tank Creek, and Virginia Gulch), two "pass-through" sheep allotments (Burnt Timber and Spring Gulch) which are used for approximately two weeks in both the spring and fall: for a total of approximately 2,250 ewes plus lambs (which are not counted). The Canyon Creek Allotment is currently permitted for 120 cow-calf pairs.

In summary, the trend in permitted sheep grazing has steadily declined over the years, and is dramatically lower in numbers and distribution than historical use. Several allotments in the landscape have been permitted to be used by cattle occasionally over the years (Burnt Timber, Canyon Creek, Fall Creek, and Spring Gulch). The allotment files indicate that many of the currently vacant allotments, notably Johnson, Leviathan, Pine River, and Rock Creek had a history of non-use attributed in part to difficult access, limited suitable grazing acreage, and conflicts with high recreational use (*Whitmer 2011*). While many factors have contributed to the decline in sheep stocking on the Columbine Ranger District, the predominant factor is probably the steady decline in demand for wool and lamb.

Table 1-1 shows the total allotment acres, the highest recorded use, the currently permitted numbers of each allotment, the average stocking rate during the last five years of stocking, and the last year each allotment in the analysis area was stocked by domestic sheep. This information was derived from Forest Service allotment files (*Whitmer 2011*).

Table 1-1. Sheep Stocking by Allotment

Allotment	Total Acres	Highest Recorded Sheep Numbers*	Currently Permitted Sheep Numbers	Actual Use (last 5-year ave.)	On Date Range	Off Date Range	Days of use	Last year of actual sheep use
Burnt Timber+ -CanyonCrk band -Tank Crk band -VA Gulch band	5,092	(2625)**	(1550)**	(2075) **	6/24 - 7/4 6/25 - 7/5 6/26 - 7/6	9/14 - 9/30 9/18 - 9/24 9/16 - 10/1	27 18 27	2012 2015 2015
Canyon Creek+	6,328	600	600	600	7/5	9/13	71	2012
Endlich Mesa+	11,222	850	700	775	7/1	9/25	87	2015
Spring Gulch+	3,077	700	700	700	6/15 - 6/30	9/22 - 10/5	16	2015
Tank Creek+	10,884	1000	700	700	7/6	9/14	71	2015
Virginia Gulch+	12,571	1025	850	775	7/10	9/15	68	2015
Cave Basin	22,452	1400	0	0	7/1	9/15	77	1988
Fall Creek	11,385	1000	0	0	7/1	9/15	77	1968
Flint Creek	16,359	950	0	0	1/1	9/15	77	1972
Johnson Creek	9,461	388	0	0	7/16	9/15	62	1968
Leviathan	6,530	900	0	0	7/1	9/15	77	1970
Pine River	38,843	3600	0	0	7/1	9/15	77	1980
Rock Creek	10,880	1800	0	0	7/1	9/15	77	1970
Needles Mountains	1,544							

+Active allotments are shaded in the table
*Highest numbers in any year for the allotment in its present configuration
**same sheep as for the corresponding three allotments

1.3 EXISTING CONDITIONS

The need for a change in management is identified by comparing what is desired across the landscape (desired conditions) to what currently exists on the landscape in the analysis area (existing conditions).

Existing Conditions for Riparian and Upland Vegetation: In 2009-2012, the FS collected data to document existing conditions across the landscape. Upland data points were rated using the Rangeland Health Evaluation Matrix (RHM) methodology (*USDA 1996*), which is a qualitative ranking of conditions based on Abiotic Characteristics, Vegetative Conditions, and Recovery Mechanisms. Each site results in a ranking of "Healthy", "At Risk", or "Unhealthy." A trend was assigned as either "stable," "upward," "downward," or "not apparent."

Riparian data points were evaluated using the Proper Functioning Condition (PFC) methodology (*USDA 1996*), which is a qualitative ranking of riparian conditions based on Hydrology, Vegetation, and Erosion. Each site results in a ranking of "Functional," "Functional-At Risk," or "Nonfunctional." A trend was then assigned to each site, the same as for the upland sites.

Table 1-2 (p. 14) and Figure 1-3 (next page) show the results these ratings. Of a total of 53 data points (38 upland RHM data points and 15 riparian PFC data points), 50 points were meeting desired conditions (described in *Section 1.4* on page 11). The remaining three points do not meet desired conditions and consisted of: one RHM rated Healthy with a downward trend, one RHM rated At Risk with a downward trend, and one PFC rated At Risk with an unapparent trend.

Examination of the body of available data reveals that, for the project area at the overall landscape level, vegetative conditions are meeting desired conditions (94% of the data points). However, there are isolated areas of concern noted by FS personnel, specifically at bed grounds and trailing "choke points." More detailed descriptions of the data can be found in Affected Environment of the Water and Vegetation sections in *Chapter 3*.

Existing Conditions for Bighorn: Figure 1-4 displays current grazing allotments and Colorado Parks and Wildlife (CPW) mapped bighorn sheep summer range, also called Core Herd Home Range (CHHR). There are currently about 46,053 acres of potential mapped overlap in the Weminuche Landscape, with 2,457 acres in active allotments and 43,596 acres in vacant allotments. This existing condition is undesirable due to potential for contact between domestic sheep and bighorn sheep, leading to the possibility of disease transmission between the two species.

Existing Conditions for Wilderness: Figure 1-5 displays where grazing allotments and wilderness overlap. Because the desired conditions for wilderness are related primarily to vegetation conditions, the conclusions for existing wilderness conditions are generally the same as for vegetative existing conditions, in that existing conditions are generally meeting desired conditions. However, there were isolated locations within wilderness (Emerald and Pearl Lakes, along the Lime Mesa Trail, Stump Lakes, and Burnt Timber Trail) where conditions were noted to be of concern.

Figure 1-3. Existing Conditions/Monitoring Points

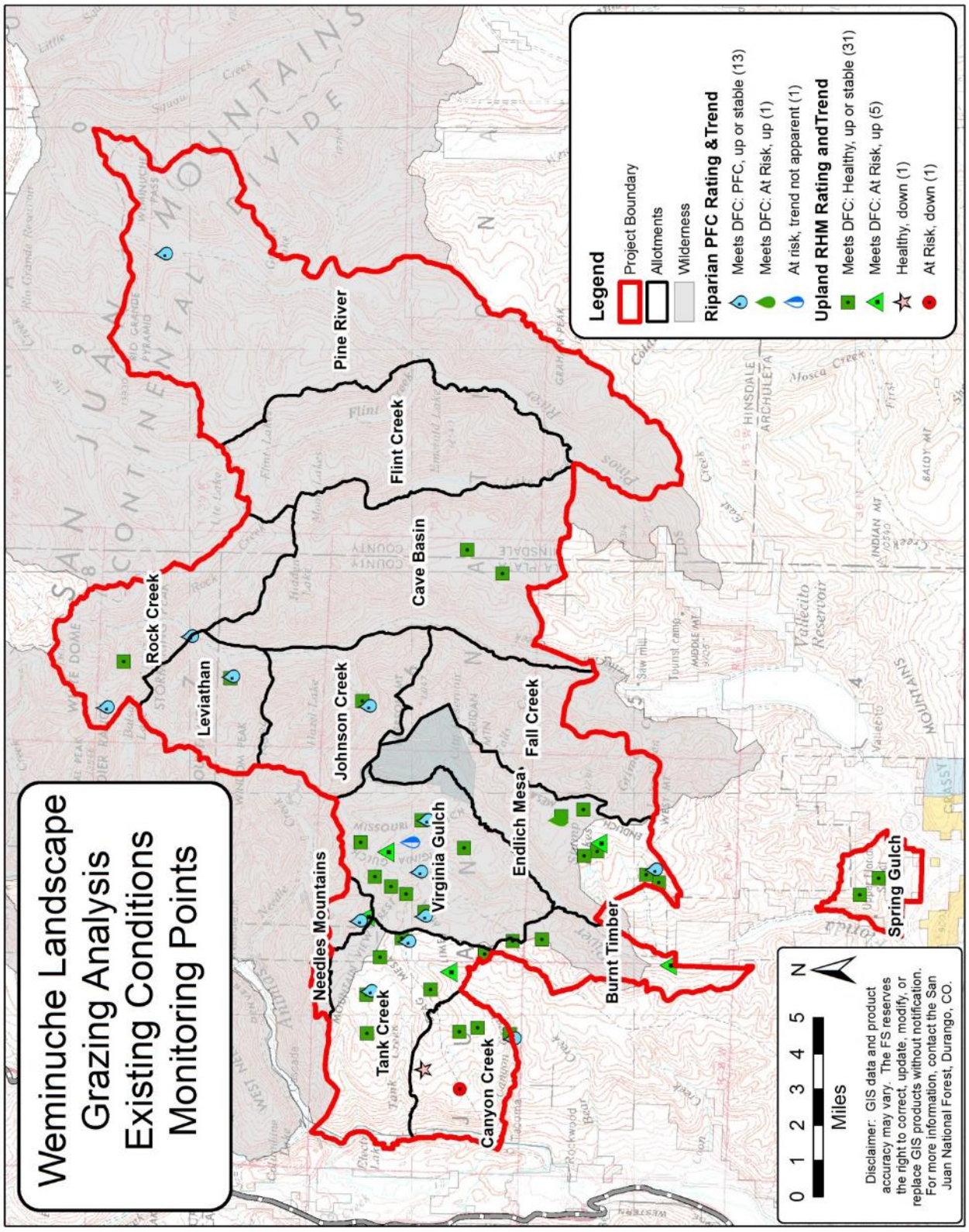


Figure 1-4. Bighorn Overlap with Current Allotment Boundaries

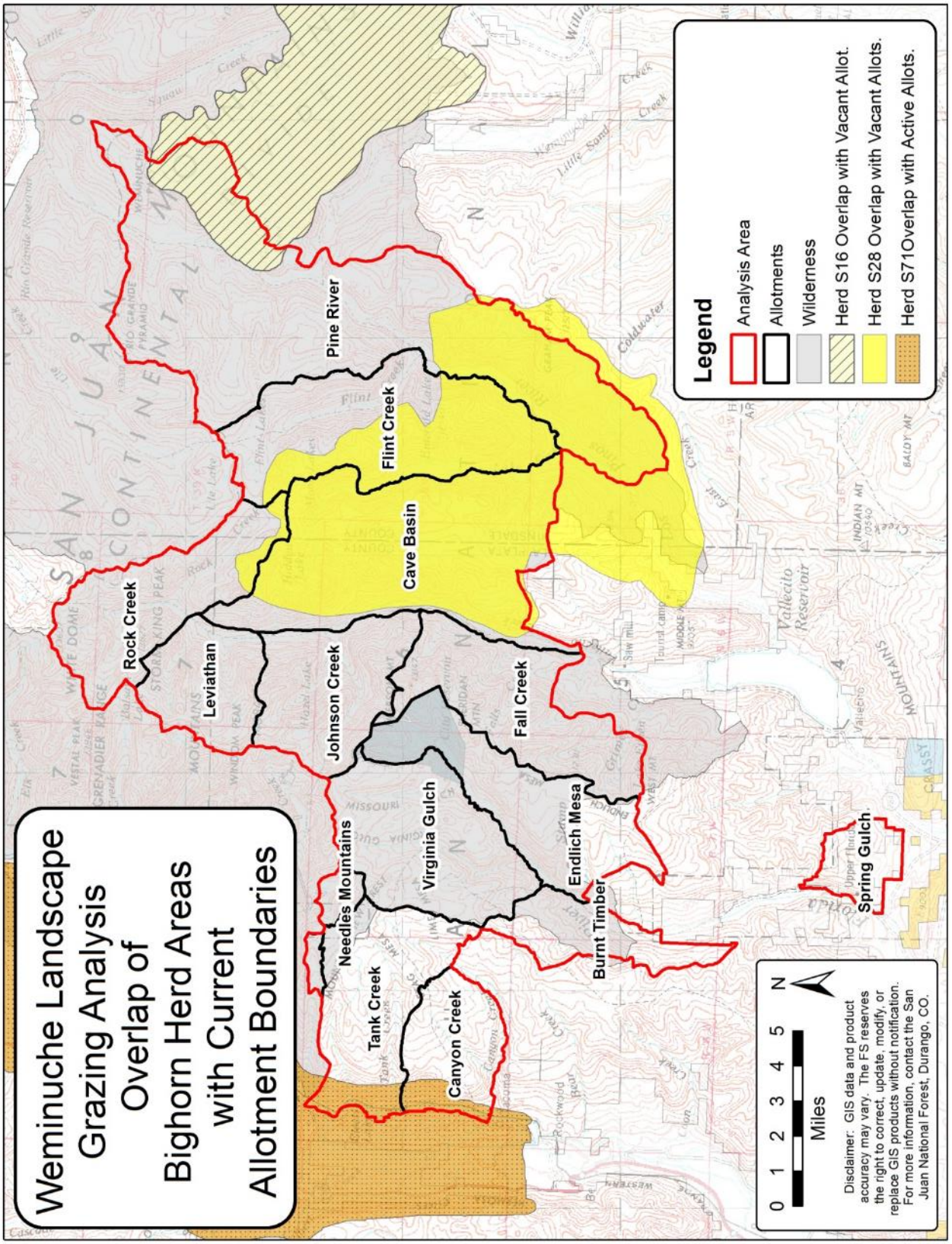
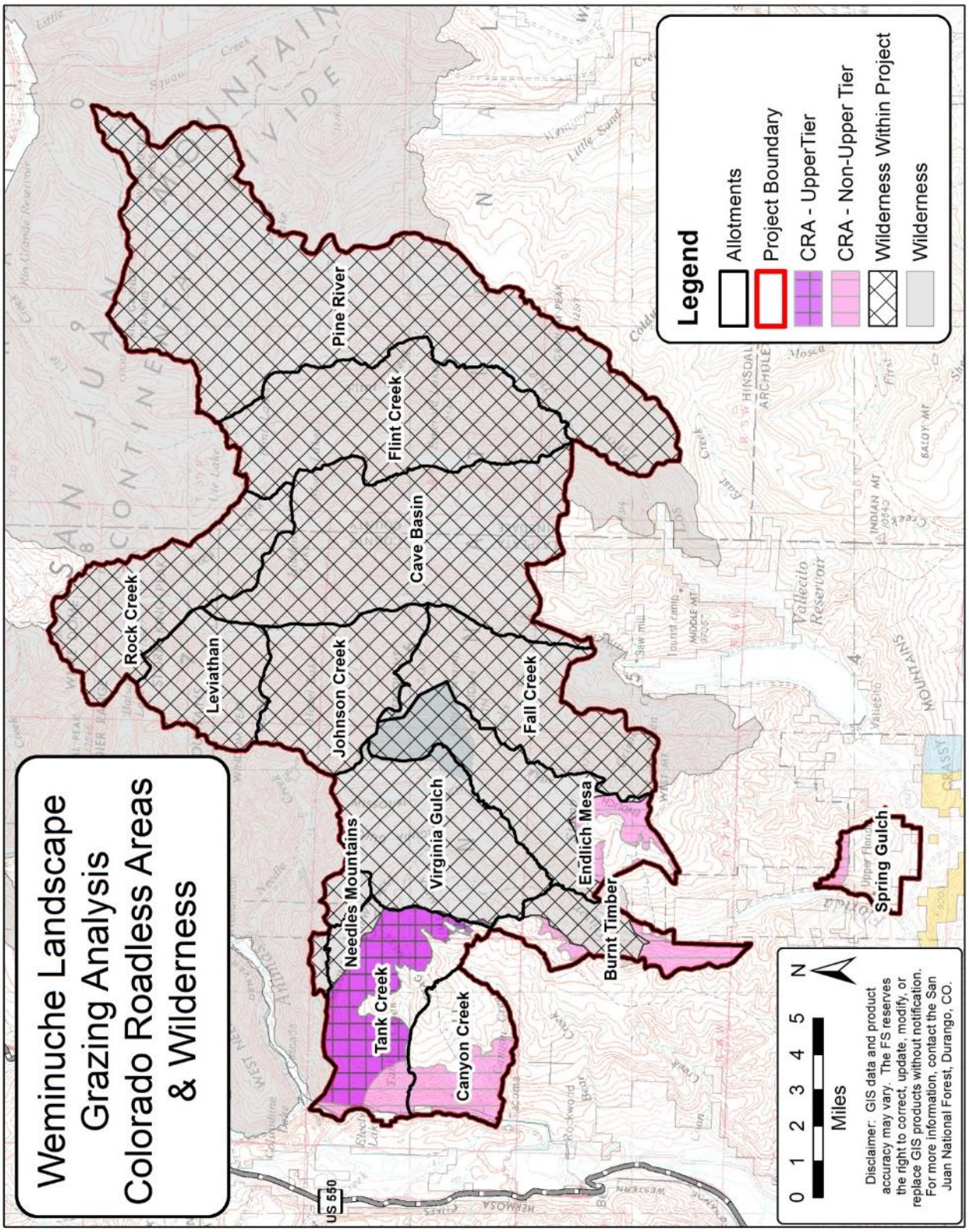


Figure 1-5. Roadless and Wilderness



1.4 DESIRED CONDITIONS

The desired conditions, standards, and guidelines listed in the Forest Plan (see page 22), and the 1998 Wilderness Management Direction, provide a basis for the definition of site-specific desired condition goals. For this project, landscape scale desired conditions are defined for the entire analysis area, and site-specific desired conditions are defined for benchmark sites and/or key areas. *Benchmark areas* are sites sensitive to changes in land management activities, represent the key resources and concerns associated with the project, and are used to measure long-term conditions and trends relative to project activities. *Key areas* are implementation monitoring sites and serve as annual monitoring sites. Key areas may also serve as benchmark sites for long-term trend monitoring. Benchmark and/or key areas do not necessarily represent conditions over entire allotments. Some benchmark areas and key areas have been established and more may be established as needed in the future. Benchmark areas and key areas will generally be open meadows or other areas in suitable range most likely to be grazed by permitted livestock.

The desired conditions defined by the Responsible Official for this analysis are as follows:

At the landscape scale:

Bighorn Sheep: Reduce or eliminate overlap between active domestic sheep allotments and CPW mapped bighorn sheep summer ranges, also called Core Herd Home Range (CHHR). Prevent physical contact between bighorn sheep and domestic sheep. Manage domestic sheep to achieve effective separation from bighorn sheep.

Allowable Use: Utilization guidelines are met across the analysis area. Allowable forage utilization should not exceed 45-50%.

Noxious Weeds: No increase in noxious weeds in the analysis area as a result of domestic sheep grazing activities.

At the site-specific scale:

Plant Community: Native grass and forb species continue to dominate in both the short and long term.

Upland Rangeland Health: Rangelands are Healthy with a stable or upward trend; or if At-Risk, the trend is upward. Vigor and production on all grass and forb species is high. There is no increase in noxious weeds as a result of domestic sheep grazing activities. There is no soil loss off-site, and no pedestaling or gully formation occurs as a result of domestic sheep grazing activities.

Riparian Health: Riparian conditions are Functional; or if Functional-At Risk, the trend is upward.

1.5 PURPOSE AND NEED FOR ACTION

The purpose of this action is to administer term livestock grazing on all or portions of the Weminuche Landscape in such a manner that will meet or move existing resource conditions toward desired conditions, and be consistent with the Forest Plan direction, including standards and guidelines. The site-specific need for those areas where desired conditions are currently being met is to maintain or improve current conditions. The site-specific need for change for those areas which are *not* meeting or moving toward desired conditions is to bring existing conditions up to, or moving towards the desired conditions in a timely manner.

The site-specific need for change in vegetative conditions is to improve conditions at the isolated sites that were noted to be in undesirable condition by implementing adaptive grazing management practices. Table 1-2 (p. 14) lists Existing Conditions, Desired Conditions, Need for Change, and some Adaptive Management Options for each individual monitoring site in the landscape.

The need for change regarding bighorn sheep is to reduce the risk for disease transmission by preventing physical contact between bighorn sheep and permitted domestic sheep and goats. This could be dealt with on allotments that are not currently active by closing the allotments to domestic sheep grazing or by imposing requirements prior to restocking that would prevent disease transmission. The two active allotments with mapped overlap between bighorn sheep range and domestic sheep (Canyon Creek and Tank Creek) could move toward desired conditions for bighorn sheep through re-alignment of allotment boundaries to match topographical features and suitable range on the allotments, and through application of Design Criteria, by maintaining current domestic sheep distribution patterns, and/or by conversion of the allotments to cattle.

In addition, there is a need to continue to provide the opportunity for permitted domestic livestock grazing on the Columbine Ranger District. The analysis area contains lands identified as suitable for domestic livestock grazing in the Forest Plan, and authorizing future domestic livestock grazing is consistent with the goals, objectives, standards and guidelines of the Forest Plan. It is Forest Service policy to make forage available to qualified livestock operators from lands suitable for livestock grazing consistent with land management plans (*36 CFR 222.2 (c), FSM 2203.1*), and to continue contributions to the economic and social well-being of people by providing opportunities for economic diversity and by promoting stability for communities that depend on rangeland resources for their livelihood (*FSM 2202*).

1.6 PREFERRED ALTERNATIVE SUMMARY

A detailed description of the Preferred Alternative can be found in *Chapter 2, Section 2.2.4*; following is a brief summary of key points of the Preferred Alternative. The Preferred Alternative is to administer term livestock grazing incorporating adaptive management strategies on six active allotments: Burnt Timber, Canyon Creek, Endlich Mesa, Spring Gulch, Tank Creek and Virginia Gulch.

Boundary adjustments would be made to eliminate mapped overlap between domestic sheep and bighorn sheep ranges, more accurately reflect natural boundaries, and better reflect actual domestic sheep usage on the ground. The western-most parts of Tank Creek and Canyon Creek would be removed from these allotments and not used except for livestock trailing to reach the allotments.

A small portion of the Needles Mountains Allotment would be added to the Tank Creek and Virginia Gulch Allotments.

Most of Cave Basin, Fall Creek, Flint Creek, Johnson Creek, Leviathan, Pine River, and Rock Creek Allotments would remain vacant, but with specific requirements to be met prior to any future restocking.

This alternative would also include monitoring and a variety of "tools", or adaptive management actions, to meet or move towards desired resource conditions (Table 1-2, next page). Adaptive Management is designed to be flexible in regards to livestock numbers, season dates, and class of livestock, and to respond to unforeseen circumstances. Also included in the Preferred Alternative are specific actions included in Site-Specific Design Criteria, and other general Design Criteria as described in *Chapter 2*. Design Criteria, a monitoring plan, and adaptive management tools were crafted to work together to improve conditions where needed, and to be consistent with Forest Plan direction.

Table 1-2. Existing & Desired Vegetative Conditions, Need for Change, and Adaptive Options

Area	Existing Conditions	Site Specific Desired Conditions	Need for Change	Site Specific Design Criteria / Adaptive Options	Priority for Monitoring
Allotment: Burnt Timber					
Key Area: **BT-RHM1** Burnt Tumber Trail; big open park north of Burnt Timber Creek Vegetation type: Mountain Grass	Considered healthy using the RHM method. *Trend:* stable.	Retain healthy conditions.	This site is healthy under current management practices.		
Key Area: **BT-RHM2** West of Transfer Park campground Vegetation type: Aspen/ Mixed Conifer	Considered at risk using the RHM method. *Trend:* upward.	Improve conditions to healthy or retain the upward trend.	Decrease the % of bare soil. Decrease utilization in area surrounding monitoring point	1. Establish a cover frequency monitoring location near key area. 2. Reduce utilization by minimizing length of time in area.	**
Key Area: **BT-RHM3** Top of Burnt Timber along trail Vegetation type: Spruce Fire– old logging area – Mountain Grass	Considered healthy using the RHM method. *Trend:* stable.	Retain healthy conditions.	This site is healthy under current management practices.		
Allotment: Canyon Creek					
Key Area: **CC-PFC1** Canyon Creek Vegetation type: Riparian within Spruce Fir upland.	Rated in proper functioning condition using the PFC method. *Trend:* stable.	Retain proper functioning condition.	This site is functioning properly. No need for change.		
Key Area: **CC-RHM1** Canyon Creek uplands Vegetation type: Aspen – Mixed Conifer	Considered healthy using the RHM method. *Trend:* stable.	Retain healthy conditions.	This site is healthy under current management practices.		
Key Area: **CC-RHM2** Big park south end of allotment Vegetation type: Spruce-Fir – Mtn grass	Considered healthy using the RHM method.. *Trend:* stable.	Retain healthy conditions.	This site is healthy under current management practices.		
Benchmark Area: **CC-RHM3** Big park south end of allotment Vegetation type: Spruce-Fir – Mtn grass	Considered healthy using the RHM method. *Trend:* stable.	Retain healthy conditions.	This site is healthy under current management practices.	1. Continue photo monitoring near key area	**
Key Area: **CC-RHM4** North end of Canyon Creek Vegetation type: Spruce –Fir – Mountain Grassland park	Considered healthy using the RHM method. *Trend:* downward.	Retain healthy conditions.	Reduce % of invaders- golden banner, death camus, and Canadian thistle.	1. Continue photo monitoring near key area. 2. Reduce utilization by minimizing length of time in area to allow for increased competition of native graminoids.	**
Key Area: **CC-RHM5** Holding pasture near range cabin Vegetation type: Mountain Grass	Considered at risk using the RHM method. *Trend:* downward.	Improve conditions to a stable or upward trend.	Decrease the % of bare soil. Decrease the % of invaders in area (dandelions, golden banner, and aster)	1. Establish a cover frequency monitoring location meadow near key area. 2. Reduce utilization by minimizing length of time in area. 3. Increase % of bunch grasses by 10% within next 10 years.	**
Allotment: Cave Basin					
Key Area: **CB-RHM1** Head of Second Creek west of trail Vegetation type: Alpine	Considered healthy using the RHM method. *Trend:* stable.	Retain healthy conditions.	This site is healthy under current management practices.		
Key Area: **CB-RHM2** South part of Cave Basin allotment along trail Vegetation type: Mixed Conifer-riparian	Considered healthy using the RHM method. *Trend:* stable.	Retain healthy conditions.	This site is healthy under current management practices.	1. Continue photo monitoring of site if cattle use the allotment.	**

Area	Existing Conditions	Site Specific Desired Conditions	Need for Change	Site Specific Design Criteria / Adaptive Options	Priority for Monitoring
Allotment: Endlich Mesa					
Key Area: **EM-PFC1** Head of McCoy Gulch Vegetation type: Riparian within Spruce Fir upland.	Rated in proper functioning condition using the PFC method. *Trend:* stable.	Retain proper functioning condition.	This site is functioning properly. No need for change.		
Key Area: **EM-PFC2** Trail crossing on Endlich Mesa Trail Vegetation type: Riparian with willows	Rated in "functional - at risk" condition using the PFC method. *Trend:* upward.	Improve conditions to proper functioning condition or retain the upward trend.	Reduce trampling at trail crossing	1. Do not use trail crossing for moving sheep through allotment. Keep sheep at least 100' away from trail.	**
Key Area: **EM-RHM1** Head of McCoy Gulch Vegetation type: Mtn Grass - Spruce Fir	Considered healthy using the RHM form. *Trend:* stable.	Retain healthy conditions.	This site is healthy under current management practices.		
Key Area: **EM-RHM2** NW of Miller Mtn. Vegetation type: Spruce Fir	Considered healthy using the RHM method. *Trend:* stable.	Retain healthy conditions.	This site is healthy under current management practices.		
Key Area: **EM-RHM3** East of Stump Lakes Vegetation type: Spruce Fir logged	Considered healthy using the RHM method. *Trend:* stable.	Retain healthy conditions.	This site is healthy under current management practices.		
Key Area: **EM-RHM4** East of Stump Lakes Vegetation type: Mountain Grass - Spruce Fir logged	Considered at risk using the RHM method. *Trend:* upward.	Improve the conditions to healthy or retain the upward trend.	Decrease the % of bare soil.	1. Establish a cover frequency monitoring location in the park near key area. 2. Reduce bare ground and soil movement linked to trail.	**
Key Area: **EM-RHM5** NE of Stump Lakes Bedground#1 Vegetation type: Spruce Fir logged	Considered healthy using the RHM method. *Trend:* stable.	Retain healthy conditions.	This site is healthy under current management practices.		
Key Area: **EM-RHM6** Endlich Mesa west of trail – bedground #2 Vegetation type: Alpine	Considered healthy using the RHM method. *Trend:* stable.	Retain healthy conditions.	This site is healthy under current management practices.		
Key Area: **EM-RHM7** Endlich Mesa east of trail – bedground #3 Vegetation type: Alpine	Considered healthy using the RHM method. *Trend:* stable.	Retain healthy conditions.	This site is healthy under current management practices.		
Allotment: Johnson Creek					
Key Area: **JC-PFC1** West of switch-backs along Johnson Creek Vegetation type: Riparian within Spruce Fir upland.	Rated in proper functioning condition using the PFC method. *Trend:* stable.	Retain proper functioning condition.	This site is functioning properly. No need for change.		
Key Area: **JC-RHM1** Near switch-backs on Johnson Creek Trail Vegetation type: Mixed Conifer	Considered healthy using the RHM method. *Trend:* stable.	Retain healthy conditions.	This site is healthy under current management practices.	1. Continue of photo monitoring site if sheep use the allotment. 2. Implement bighorn sheep pre-monitoring prior to using allotment.	
Allotment: Leviathan					
Key Area: **LE-PFC1** Sunlight Creek Vegetation type: Riparian within Spruce Fir upland.	Rated in proper functioning condition using the PFC method. *Trend:* stable.	Retain proper functioning condition.	This site is functioning properly. No need for change.		
Key Area: **LE-RHM1** Aspen park along Sunlight Creek Trail Vegetation type: Mixed Conifer	Considered healthy using the RHM method. *Trend:* upward.	Retain healthy conditions.	This site is healthy under current management practices.	1. Continue of photo monitoring site if sheep use the allotment. 2. Implement bighorn sheep pre-monitoring prior to using allotment.	

Area	Existing Conditions	Site Specific Desired Conditions	Need for Change	Site Specific Design Criteria / Adaptive Options	Priority for Monitoring
Allotment: Pine River					
Benchmark Area: **PR-PFC1** Rincon LaVaca Creek west of confluence of Pine River Vegetation type: Riparian within Mountain grassland	Rated in proper functioning condition using the PFC method. *Trend:* stable.	Retain proper functioning condition.	This site is functioning properly. No need for change.		
Allotment: Rock Creek					
Key Area: **RC-PFC1** Trinity Creek near Trinity Lake Vegetation type: Riparian with willows	Rated in proper functioning condition using the PFC method. *Trend:* stable.	Retain proper functioning condition.	This site is functioning properly. No need for change.		
Key Area: RC-**PFC2** Vallecito Creek Vegetation type: Riparian within Spruce Fir upland.	Rated in proper functioning condition using the PFC method. *Trend:* stable.	Retain proper functioning condition.	This site is functioning properly. No need for change.		
Key Area: **RC-RHM1** Campsite near Trinity Creek Trail Vegetation type: Spruce-Fir –mountain meadow	Considered healthy using the RHM method. *Trend:* upward.	Retain healthy conditions.	This site is healthy under current management practices.	1. Continue of photo monitoring site if sheep use the allotment. 2. Implement bighorn sheep pre-monitoring prior to using allotment.	
Allotment: Spring Gulch					
Key Area: **SG-RHM1** NW ridge saddle Vegetation type: Aspen	Considered healthy using the RHM method. *Trend:* Stable	Retain healthy conditions.	This site is healthy under current management practices.		
Key Area: **SG-RHM2** Near logging road and spring – middle of allotment Vegetation type: Aspen	Considered healthy using the RHM method. *Trend:* Stable	Retain healthy conditions.	Site is healthy, however, need to decrease % of noxious weeds in area (Canada thistle and toadflax).	1. Continue photo monitoring in the park near key area. 2. Treat noxious weeds in area	**
Allotment: Tank Creek					
Key Area: **TC-PFC1** Trib to Canyon Creek – north end of Lime Mesa Vegetation type: Riparian with willows	Rated in proper functioning condition using the PFC method. *Trend:* stable.	Retain proper functioning condition.	This site is functioning properly. No need for change.		
Key Area: **TC-PFC2** Grasshopper Creek trib Vegetation type: Riparian with willows	Rated in proper functioning condition using the PFC method. *Trend:* stable.	Retain proper functioning condition.	This site is functioning properly. No need for change.		
Key Area: **TC-PFC3** Ruby Lake Vegetation type: Riparian with alpine	Rated in proper functioning condition using the PFC method. *Trend:* stable.	Retain proper functioning condition.	This site is functioning properly. No need for change.		
Key Area: **TC-RHM1** SW of Lime Mesa Trailhead Vegetation type: Mountain grass	Considered healthy using the RHM method. *Trend:* Stable	Retain healthy conditions.	This site is healthy under current management practices.		
Benchmark Area: **TC-RHM2** NW of Lime Mesa Vegetation type: Alpine	Considered healthy using the RHM method. *Trend:* Stable	Retain healthy conditions.	This site is healthy under current management practices.	1. Continue photo monitoring site near key area.	**

Area	Existing Conditions	Site Specific Desired Conditions	Need for Change	Site Specific Design Criteria / Adaptive Options	Priority for Monitoring
Key Area: **TC-RHM3** Top of Stag Mesa Vegetation type: Spruce - Fir	Considered healthy using the RHM method. *Trend:* Stable	Retain healthy conditions.	This site is healthy under current management practices.		
Key Area: **TC-RHM4** North of Stag Mesa Vegetation type: Alpine	Considered healthy using the RHM form. *Trend:* Stable	Retain healthy conditions.	This site is healthy under current management practices.		
Benchmark Area: **TC-RHM5** North of Tank Mesa – near TC-PFC2 Vegetation type: Alpine	Considered healthy using the RHM method. *Trend:* Stable	Retain healthy conditions.	This site is healthy under current management practices.	1. Continue photo monitoring site near key area.	**
Key Area: **TC-RHM6** West end of Tank Mesa – end of logging road Vegetation type: Spruce – Fir - logging	Considered healthy using the RHM method. *Trend:* Stable	Retain healthy conditions.	This site is healthy under current management practices.		
Key Area: **TC-RHM7** West of Lime Mesa on old logging road Vegetation type: Spruce – Fir – old logging road/herder camp	Considered at risk using the RHM method. *Trend:* upward.	Improve conditions to healthy or retain the upward trend.	Decrease the % of bare soil. Decrease % of noxious weeds in area (Canada thistle)	1. Establish a cover frequency monitoring location in the park near key area. 2. Reduce bare ground and soil movement linked to logging road by 10% within next 10 years. 3. Treat noxious weeds in area	**
Allotment: Virginia Gulch					
Key Area: **VG-PFC1** Middle of West Silver Mesa Vegetation type: Riparian with willows	Rated in "functional - at risk" condition using the PFC method. *Trend:* not apparent.	Improve conditions to proper functioning condition or establish an upward trend.	Reduce trampling at trail crossings of stream	1. Do not use trail crossing for moving sheep through allotment. Keep sheep at least 100' away from stream. 2. Continue with photo-point monitoring	**
Key Area: **VG-PFC2** Missouri Gulch Vegetation type: Riparian with willows	Rated in proper functioning condition using the PFC method. *Trend:* stable.	Retain proper functioning condition.	This site is functioning properly. No need for change.		
Key Area: **VG-PFC3** Virginia Gulch Vegetation type: Riparian with willows	Rated in proper functioning condition using the PFC method. *Trend:* stable.	Retain proper functioning condition.	This site is functioning properly. No need for change.		
Key Area: **VG-PFC4** West Virginia Gulch Vegetation type: Riparian with willows	Rated in proper functioning condition using the PFC method. *Trend:* stable.	Retain proper functioning condition.	This site is functioning properly. No need for change.		
Key Area: **VG-RHM1** Ridge between West Virginia and Virginia Gulches Vegetation type: Alpine with willows	Considered healthy using the RHM method. *Trend:* Stable	Retain healthy conditions.	This site is healthy under current management practices.		
Key Area: **VG-RHM2** Headwaters of Virginia Gulches Vegetation type: Mountain Grassland with willows	Considered healthy using the RHM method. *Trend:* Stable	Retain healthy conditions.	This site is healthy under current management practices.		
Key Area: **VG-RHM3** Headwaters of Virginia Gulch Vegetation type: Alpine	Considered healthy using the RHM method. *Trend:* Stable	Retain healthy conditions.	This site is healthy under current management practices.	1. Continue photo monitoring site near key area.	**

Area	Existing Conditions	Site Specific Desired Conditions	Need for Change	Site Specific Design Criteria / Adaptive Options	Priority for Monitoring
Key Area: **VG-RHM4** West Silver Mesa Vegetation type: Alpine	Considered healthy using the RHM method. *Trend:* Stable	Retain healthy conditions.	This site is healthy under current management practices.		
Key Area: **VG-RHM5** Middle of West Silver Mesa Vegetation type: Alpine	Considered at risk using the RHM method. *Trend:* upward.	Improve conditions to healthy or retain the upward trend.	Decrease the % of bare soil.	1. Establish a cover frequency monitoring location in the park near key area. 2. Reduce bare ground and soil movement linked to sheep trailing by 10% within next 10 years. 3. Re-inventory the West Silver bladderpod population within 5 years.	**
Key Area: **VG-RHM6** Missouri Gulch uplands Vegetation type: Mountain Grassland	Considered healthy using the RHM method. *Trend:* Stable	Retain healthy conditions.	This site is healthy however; need to reduce willow browsing and bare ground in area.	1. Continue photo monitoring site near key area. 2. Reduce % of willow browse and % bare ground by 10% by 2022.	**
Key Area: **VG-RHM7** Headwaters of Virginia Gulch near Oliver Lakes Vegetation type: Alpine	Considered healthy using the RHM method. *Trend:* Stable	Retain healthy conditions.	This site is healthy under current management practices.		
Key Area: **VG-RHM8** Headwaters of Virginia Gulch - West Virginia Gulch Vegetation type: Alpine	Considered healthy using the RHM method. *Trend:* Stable	Retain healthy conditions.	This site is healthy under current management practices.		
Key Area: **VG-RHM9** SE of Ruby Lake Vegetation type: Alpine	Considered at risk using the RHM method. *Trend:* upward.	Improve conditions to healthy or retain the upward trend.	Decrease the % of bare soil.	1. Continue photo monitoring in the park near key area. 2. Reduce bare ground and soil movement linked to recreation and sheep trailing by 10% within next 10 years.	**

1.7 PUBLIC INVOLVEMENT AND ISSUES

1.7.1 Public Involvement

The following public involvement activities have occurred to date for this project proposal:

- The proposal was first listed in the Schedule of Proposed Actions in the January-March 2012 edition, which was available on-line and through quarterly mailings. It has remained on the Schedule since that time.
- Two permittee scoping meetings were held on May 6, 2011 and January 20, 2012 for those who hold livestock grazing permits on this landscape. During the past three years, annual spring meetings were also held with grazing permittees to discuss current permitted actions, and ideas for possible adaptive actions on the landscape. During these meetings, we discussed and looked at existing domestic sheep use across the landscape, logical boundary adjustments, forage reserves, possible Design Criteria and various other ideas that were essential to developing the alternatives. Permittees recognized the importance of separation between domestic sheep and bighorn sheep and agreed to all boundary shifts including the western boundary adjustments of Canyon Creek and Tank Creek. In addition to this, numerous phone conversations have occurred with the permittees to get feedback and additional background information. Through this collaborative process, the initial project proposal (Alternative 3) was developed.
- A scoping meeting with CPW was held on December 16, 2011. The proposal was also provided to the public and other agencies for comment during scoping beginning in February 2012, through a scoping letter and press release which resulted in newspaper articles. Initial scoping letters were also sent to nearby livestock permittees outside the analysis areas and outfitters and guides that have permits within the analysis area. In addition, as part of the public involvement process, the Forest Service sent notification to area Tribes, Chapter Houses, and Pueblos.
- Written scoping responses were received from 57 sources; comments covered a full range of opinions regarding sheep grazing. Using the comments and concerns from the public, organized groups, other agencies, and internal specialists, the Responsible Official approved a list of issues to address in this analysis, found in the next section of this Environmental Impact Statement (EIS).
- Also using scoping responses, the details of Alternative 3 were filled in, and an Alternative 4 was added. As the process of analysis proceeded, Alternative 4 was determined to be the Preferred Alternative.
- Two 30-day public comment periods were held during May-July 2014 on the preceding Environmental Assessment (EA). Responses were received from 81 external sources, in addition to over 300 form letters from one organization.
- Numerous discussions and conversations regarding this analysis have occurred in a variety of settings which were not part of the formal scoping process for this project, for example: Woolgrowers meetings, annual permittee meetings, and annual Sheep Days at Engineer Pass.
- As a result of comments received, the FS decided to analyze this project through an EIS rather than an EA. Additional analysis was added where it was missing, most notably in

the Socio-Economic section, to reflect the value of grazing permits for individuals and the woolgrower industry and the value of bighorn sheep and wilderness recreation to local economies. Editorial changes were made for better readability, or for clarification. Alternative 4, the Preferred Alternative, was crafted after considering comments.

This project falls under Objection Regulations found at 36 CFR 218 Subparts A and B. In order to object to a proposed project, a person must submit timely, specific written comments during any of the public comment periods.

1.7.2 Key Issues

Using internal and external input about the proposed project, the Interdisciplinary Team developed a list of issues to address in this EIS. The FS separated the issues into two groups: *key issues* and *non-key issues*. *Key issues* are defined as those directly or indirectly caused by implementing the proposal. Key issues also usually result in the generation of an alternative, Design Criteria, or mitigation measure that addresses that issue.

Non-key issues are identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; 4) conjectural and not supported by scientific or factual evidence; or 5) fully supportive of, or addressed by, the proposed action . The Council for Environmental Quality NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…" A list of non-key issues and reasons regarding their categorization as non-key may be found in the project record.

The FS identified five key issue topics generated from scoping. Additionally, one tracking issue will be analyzed. *Tracking issues* are a sub-set of non-key issues, and are defined as those not identified as key issues, but deemed important enough to track through the analysis and disclose impacts.

Indicators which can be used to compare impacts between alternatives are listed for each issue.

1) Soil/Water: Improper trailing and bedding of livestock has sometimes led to erosion (including trail tread damage and terracing), and water quality issues (sedimentation and fecal contamination). *Indicators for comparing alternatives: monitoring measures (PFC) to be done, Watershed Design Criteria to be applied; qualitative narrative description of impacts.*

2) Vegetation: Improper trailing and bedding of livestock has sometimes led to undesirable species composition and damage to delicate alpine vegetation. *Indicators for comparing alternatives: acres grazed; monitoring measures (RHM) to be done; Design Criteria to be applied; qualitative narrative description of impacts.*

3) Recreational Experience: Sheep bands have sometimes negatively impacted the recreational experience by noise and smell, by encounters with unruly guard dogs, by creating a non-wilderness experience, by reducing wildflowers, and by causing trail tread damage and braided trails. *Indicators for comparing*

alternatives: Recreation Design Criteria to be applied; monitoring measures (photopoints to be done); qualitative narrative description of impacts.

4) Wildlife: Domestic sheep could transmit disease to bighorn sheep, compete for forage with wildlife (bighorn sheep, ptarmigan, elk), and could damage Canada lynx and fish habitat. *Indicators for comparing alternatives: acres of open (active, vacant, or forage reserve) allotments overlapping with bighorn core herd home range; Wildlife Design Criteria to be applied; Relative risk of physical contact between domestic and bighorn sheep, qualitative narrative description of impacts.*

5) Socio-Economics: Loss or substantial curtailment of permitted grazing could lead to economic and social damage to permittees. Continued domestic sheep grazing could lead to decreased recreational socio-economic benefits derived from the area, including benefits derived from the existence of bighorn populations. *Indicators for comparing alternatives: Present Net Value, qualitative narrative description of impacts.*

6) Cultural Resources (tracking issue): Cultural resources impacts were not identified as a key issue because no adverse impacts to them from grazing have been identified. There are no alternatives or Design Criteria that were developed specifically to minimize impacts to cultural resources, and impacts are generally the same across all alternatives. However, because of the importance of cultural resources in the Weminuche landscape, and because of statutory requirements, cultural resources will be analyzed and impacts will be disclosed. *Indicators for comparing alternatives: Management of sheep reflected by Design Criteria; qualitative narrative description of impacts.*

1.8 COMPLIANCE WITH ADMINISTRATIVE FRAMEWORK

NEPA at 40 CFR 1502.25(a) directs "to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with …other environmental review laws and executive orders." The Forest Service has ensured compliance with other laws, as discussed in applicable sections:

- Multiple-Use Sustained-Yield Act, *Section 1.8*
- National Forest Management Act, *Section 1.8*
- Rescissions Act, *Section 1.8*
- National Environmental Policy Act, *Section 1.8*
- Wilderness Act, *Section 1.8.1 and 3.4*
- Clean Water Act, *Section 3.2*
- Endangered Species Act, *Sections 3.3 and 3.5*
- Environmental Justice Executive Order 12898, *Section 3.9*
- National Historic Preservation Act, *Section 3.10*

The principles of managing federal lands for multiple-use are well-established by law, regulation, and policy. The Multiple-Use Sustained-Yield Act (*P.L. 86-517, 1960)* directs that the national forests be managed for multiple uses, including range. The National Forest Management Act (*P.L.*

94-588, 1976) directs the FS to analyze the lands suitable for producing forage for grazing animals and to manage these lands in accordance with Forest plans. This analysis is needed at this time because the Rescissions Act (*P.L. 104-19, 1995*) requires each National Forest System unit to establish and adhere to a schedule for the completion of National Environmental Policy Act (NEPA) provisions on all grazing allotments for which NEPA analysis is needed. This document and the processes used to develop it are in compliance with the NEPA (*P.L. 91-190, 1970*), with its implementing regulations at 40 CFR 1500, with Forest Service policy in the National Environmental Policy Handbook (*FSH 1909.15*), and with pre-decisional objection regulations found at 36 CFR 218.

1.8.1 Wilderness Management Direction

The Wilderness Act, Section 4(d)(4)(2) states, "The grazing of livestock, where established prior to the effective date of this Act, shall be permitted to continue subject to such reasonable regulations as are deemed necessary by the Secretary of Agriculture" (*P.L. 88-577*). Livestock grazing on this landscape was permitted at the time of passage of the Wilderness Act and further Congressional Grazing Guidelines, which have been incorporated into Forest Service policy (*FSM 2323.2*), allow for continued permitted livestock grazing in the Weminuche Wilderness; this analysis will not further address whether grazing should be allowed in wilderness. The Grazing Guidelines clearly state that, "*The legislative history of this language is very clear in its intent that livestock grazing, and activities and the necessary facilities to support a livestock grazing program, will be permitted to continue in National Forest wilderness areas, when such grazing was established prior to classification of an area as wilderness.*" Congress set forth five basic principles in the Grazing Guidelines:

1) *"There shall be no curtailments of grazing in wilderness areas simply because an area is, or has been designated as wilderness, nor should wilderness designation be used as an excuse by administrators to slowly 'phase out' grazing. Any adjustments in the numbers of livestock permitted to graze in wilderness areas should be made as a result of revisions in the normal grazing and land management planning and policy setting process, giving consideration to legal mandates, range condition, and the protection of the range resource from deterioration..."*

2) *"The maintenance of supporting facilities, existing in the area prior to its classification as wilderness (including fences, line cabins, water wells and lines, stock tanks, etc.), is permissible in wilderness. Where practical alternatives do not exist, maintenance or other activities may be accomplished through the occasional use of motorized equipment… The use of motorized equipment should be based on a rule of practical necessity and reasonableness…"*

3) *"The replacement or reconstruction of deteriorated facilities or improvements should not be required to be accomplished using 'natural materials,' unless the material and labor costs of using natural materials are such that their use would not impose unreasonable additional costs on grazing permittees."*

4) *"The construction of new improvements or replacement of deteriorated facilities wilderness is permissible if in accordance with those guidelines and management plans governing the area involved. However, the construction of new improvements should be*

primarily for the purpose of resource protection and the more effective management of these resources rather than to accommodate increased numbers of livestock."

5) *"The use of motorized equipment for emergency purposes such as rescuing sick animals or the placement of feed in emergency situations is also permissible. This privilege is to be exercised only in true emergencies, and should not be abused by permittees."*

In summary, subject to the conditions and policies outlined above, the general rule of thumb on grazing management in wilderness should be that activities or facilities established prior to the date of an area's designation as wilderness should be allowed to remain in place and may be replaced when necessary for the permittee to properly administer the grazing program. Thus, if livestock grazing activities and facilities were established in an area at the time Congress determined that the area was suitable for wilderness and placed the specific area in the wilderness system, they should be allowed to continue. With respect to areas designated as wilderness prior to the date of this Act, these guidelines shall not be considered as a direction to re-establish uses where such uses have been discontinued.

In addition to the Forest Plan (*SJNF 2013*), management direction for the Weminuche Wilderness is found in the San Juan and Rio Grande National Forests Wilderness Management Direction, Decision Notice and associated Environmental Assessment (*SJNF 1998*), which was adopted into the Forest Plan. This Wilderness Direction further divides the wilderness into three management prescription zones:

Within the project area, there are approximately 112,655 acres of 1.11 and 1.1A Pristine zone found in the wilderness, away from major trail corridors. The desired condition is, *"where natural processes and conditions have not and will not be measurably affected by human use and where natural succession occurs on all existing vegetative communities and is influenced by natural processes and disturbance; and the structure, composition, function and spatial distribution of vegetative types are the result of natural-successional processes. Human influence on vegetation is unnoticeable; plant species are indigenous to the immediate area, with exotic plants being extremely rare. There are opportunities for solitude and a high level of risk and challenge, self-reliance, no signing or posts occur with the exception of historic cairns...there is no lasting evidence of camping activity…grazing actions will adhere to appropriate wilderness management area guidelines for structures and campsites and meet requirements of current Allotment Management Plans. Contact with other users, livestock or agency personnel are very infrequent."*

There are approximately 28,338 acres of 1.12 Primitive zone found along the trail corridors. The desired condition is, *"where natural succession occurs on all existing vegetative communities, and is influenced by natural processes and disturbance; and the structure, composition and function and spatial distribution of vegetative types are the result of natural-successional processes. Human influence on vegetation is minimal and plant species are predominately native and indigenous to the immediate areas. There are no increases in non-indigenous species composition from an established baseline. The opportunity exists for a moderate to high level of risk and challenge, campsites are dispersed and there is evidence of established campsites and basecamps may exist for commercial recreation uses. Maintained trails exist with intersection signing to indicate direction, but no mileage or destination signing. Grazing actions will adhere to appropriate management area guideline for structures, and campsites and meet requirements of*

current Allotment Management Plans. Contact with other users is infrequent off trail and moderate on trail."

There are approximately 639 acres of 1.13 Semi Primitive zone. This zone is found along the lowest reaches of the Pine River and Vallecito Creek Trails. The desired condition is, *"where natural succession occurs on all existing vegetative communities, and is influenced by natural processes and disturbance; and the structure, composition and function and spatial distribution of vegetative types are the result of natural-successional processes. Human influence on vegetation is minimal and plant species are predominately native and indigenous to the immediate areas. There are no increases in non-indigenous species composition from an established baseline. The opportunity exists for a moderate level of risk and challenge and contact with other users, livestock or agency personnel is frequent with Day Use more common. Trailhead signing and appropriate wilderness education information is available at trailheads. Commercial O-G permits for day-use activities in high-use areas are limited. Campsites are dispersed, are evident and may be designated on the ground. Grazing actions will adhere to appropriate wilderness management area guideline for structures and campsites, and meet requirements of current Allotment Management Plans."*

1.8.2 Washington Office Direction

There are three recent letters from the FS Washington Office providing direction on how to conduct bighorn sheep analysis for NEPA documents (*USDA 2011b, 2012b, 2014b*). Subsequent transmission of these letters from the Regional Office to the Forests then followed (*USDA 2011c, USDA 2104c*).

Direction is given to conduct a bighorn sheep Risk Assessment using a four-step viability analysis at the Forest Plan level. Coordination with States and use of jointly-developed GIS habitat maps was directed. The letters direct that the level of analysis should be commensurate with the complexity of the proposed action, and that accordingly, a qualitative approach can be used if reasonable rationale is displayed. Bighorn sheep viability analysis should be based on current scientific information, as available for each Forest. Maintaining spatial and/or temporal separation through the use of Best Management Practices (called Design Criteria in this document) is an emphasized approach. Where unacceptable risk of contact is identified, potential replacement allotments for domestic sheep should be identified and analyzed.

The analysis and processes used in the development of this EIS followed all direction given in these letters.

1.8.3 Forest Plan Direction

Livestock grazing has been determined by the *San Juan National Forest Land and Resource Management Plan (2013)*, hereafter referred to as the Forest Plan, to be an appropriate use of portions of the Forest and that grazing falls under the multiple-use mandate of the Forest Service (*P.L. 86-517*). The Forest Plan establishes programmatic direction for the management of National Forest System lands. The purpose and need for action relates directly to meeting Forest Plan direction within this project analysis area. The following forest-wide direction includes:

Desired Conditions

- Terrestrial ecosystems have a diverse composition of desirable native plants that are vigorous and self-perpetuating. Invasive plant species are absent or rare. 2.2.5

- Aspen forests, ponderosa pine forests, pinon-juniper woodlands, sagebrush shrublands, semi-desert shrublands, mountain grasslands, and semi-desert grasslands that occur in suitable rangelands have a diverse composition of native bunchgrasses that are vigorous and self-perpetuating. 2.2.14
- Non-forested terrestrial ecosystems have community structure and species composition that offer resistance and resilience to changes in climate, including extreme weather events, or epidemic insect and disease outbreaks. 2.2.16
- Spruce-fir forests display variable stand structures and species composition. … The canopy cover of shrubs in the understory of these forests is highly variable. … Native grasses and forbs are common and well distributed in most spruce-fir forests. Forest litter is common and well distributed. Invasive plant species are absent or rare. … All development stages of these forests are well-represented. 2.2.26
- Mountain shrublands display variable stand structures. Most are dense with high canopy cover; others are open with widely spaced shrubs. Gambel oak and other deciduous native shrubs (including mountain mahogany [*Cercocarpus montanus*], serviceberry [*Amelanchier* sp.], chokecherry [*Prunus virginiana*], fendlerbush [*Fendlera rupicola*], and squaw apple [*Peraphyllum ramosissimum*]) are abundant and well distributed. Native grasses and forbs are abundant and well distributed. Invasive plant species are absent or rare. Litter is common and well distributed. High-intensity, replacement fires occur in most mountain shrublands. 2.2.29
- Alpine terrestrial ecosystems sustain their ecosystem diversity. They display a diverse composition of desirable native plant species and vegetation communities (including fellfield and turf types). Invasive plant species are absent or rare. 2.2.34
- Fens, wetlands, and hanging gardens have the water sources and hydrologic systems necessary to support and sustain the special status plant species associated with them. 2.2.41
- Rangeland provides forage for qualified local livestock operations and helps ranches remain sustainable and intact. 2.7.1
- Rangelands provide healthy and sustainable habitat for wildlife populations. 2.7.4
- Rangelands provide diverse, healthy, and sustainable plant communities and conserve soil quality. 2.7.5
- Suitable rangelands on SJNF lands are meeting desired conditions of affected resources. 2.7.6

Standards

- Projects or activities occurring in fens, wetlands, or hanging gardens that are occupied by special status plant species must be designed to maintain the hydrologic systems necessary to support and sustain those species. 2.2.67
- During project-level planning on domestic sheep allotments, management options must be developed to prevent physical contact between domestic sheep and bighorn sheep. Actions may include but are not limited to boundary modifications, livestock type conversion, or allotment closures. 2.3.39
- Grazing permit administration in occupied bighorn sheep habitat must utilize measures to prevent physical contact between domestic sheep and bighorn sheep. Permit administration actions may include, but are not limited to use of guard dogs, grazing rotation adjustments, or relocation of salting and bed grounds. 2.3.40 & 2.7.11

- Management of domestic sheep must utilize measures to prevent physical contact with bighorn sheep. 2.7.12
- Project-level NEPA analysis and decisions, and the resultant AMPs, must identify key herbaceous and woody plant species and their respective utilization guidelines. 2.7.13
- Project-level design must incorporate habitat needs to satisfy MIS desired conditions and objectives within USFS grazing allotments. 2.7.14

Guidelines

- If grazing privileges are relinquished or cancelled on lands where…conflicts with other resources make livestock grazing undesirable, the privileges should not be re-allocated. 2.7.16
- The designation of grazing allotments to be used as forage reserves should be considered when grazing privileges terminate, if such designations would improve land management as well as livestock management opportunities. 2.7.21
- Grazing management activities should be modified in, or livestock excluded from, riparian areas that are "nonfunctional" or "functional-at risk" with a downward trend (as rated by the Proper Functioning Condition protocol), where livestock have been determined to be a key causative agent. 2.7.22
- Trailing of livestock should be avoided along riparian areas to the extent practicable. 2.7.23
- Livestock should be moved from the grazing unit or allotment when utilization guidelines on key areas are met or exceeded (45% for rotation systems), or as specified in a NEPA decision for the particular allotment's AMP or annual operating instructions. 2.7.27
- The residual riparian vegetation guidelines (4–6 inches) should be met or exceeded at the time the livestock leave the pasture/allotment. 2.7.28
- Based on vegetation type, sheep grazing should be planned to reflect moderate use after grazing. Where appropriate, such as areas outside the aspen-forb type, forage should show that it has been topped and selectively grazed, trampling should be minimal and trailing may be evident, but not common. Within the aspen-forb type, trampling and trailing may be evident, but day bedding close to water, as well as trailing to and from water, should not be evident. 2.7.30

Management Areas:

The San Juan National Forest is broken into discrete Management Areas which provide management direction by identifying allowable uses for management activities. The following are management areas for the analyzed allotments (see Figure 1-6):

- Management Area 1 – Natural Processes Dominate (wilderness). Livestock grazing is allowable. Approximately 85% of the landscape falls within this Management Area. Grazing management in wilderness is discussed in *Section 1.7.2*.
- Management Area 3 – Natural Landscape with Limited Management. Livestock grazing is allowable. About 10% of the landscape falls within this Management Area. The largest area of this type on the landscape occurs on the northern end of Missionary Ridge.
- Management Area 4 – High-Use Recreation Emphasis. Livestock grazing may be restricted within developed recreation areas. Only 1% of the landscape falls within this Management Area, located southeast of Lemon Reservoir, at Transfer Park Campground, and along the Animas River. Other than at Transfer Park, there really is no overlap between areas that are grazed and Management Area 4.

- Management Area 5 – Active Management. Livestock grazing is allowable. Approximately 4% of the landscape falls within this Management Area. These are areas on Missionary Ridge and Endlich Mesa that fall within the areas suitable for timber production (logged in the past and likely to be logged again in the future).

The Forest Plan also establishes an area's general suitability for livestock grazing by conducting a Grazing Suitability Analysis. For this analysis area, the Forest Plan level analysis has determined that approximately 58,408 acres (35%) of the total 166,628 acres within the analysis area are generally suitable for sheep grazing (Figure 1-7). This same analysis area has 50,239 acres (30%) suitable for cattle (Figure 1-8). These two determinations are based on factors including ownership, topography, slope, soils and geology, vegetation type, canopy cover and distance to water. Private lands within the analysis area (including the City Reservoir area) are not counted as being suitable since the FS does not authorize grazing on those lands; however if the lands are not fenced out (Colorado is a fence-out state), grazing likely occurs if livestock are using the surrounding area. This is a rough estimation of the amount of land that is suitable for livestock grazing. The Responsible Official accepted that the forest-level suitability determination is sufficiently accurate for this project-level analysis.

Figure 1-6. Forest Plan Management Areas

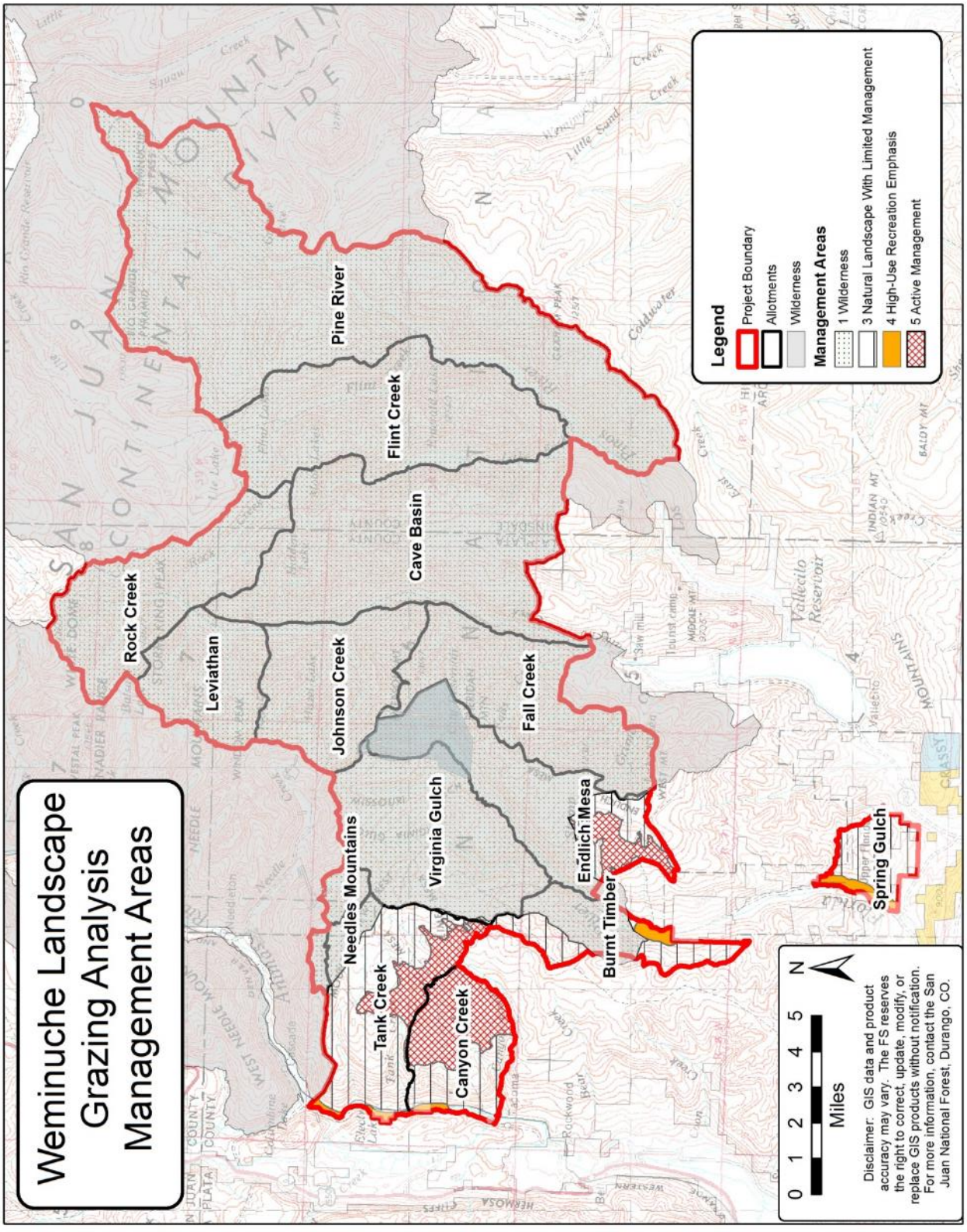


Figure 1-7. Suitable Sheep Grazing Acres

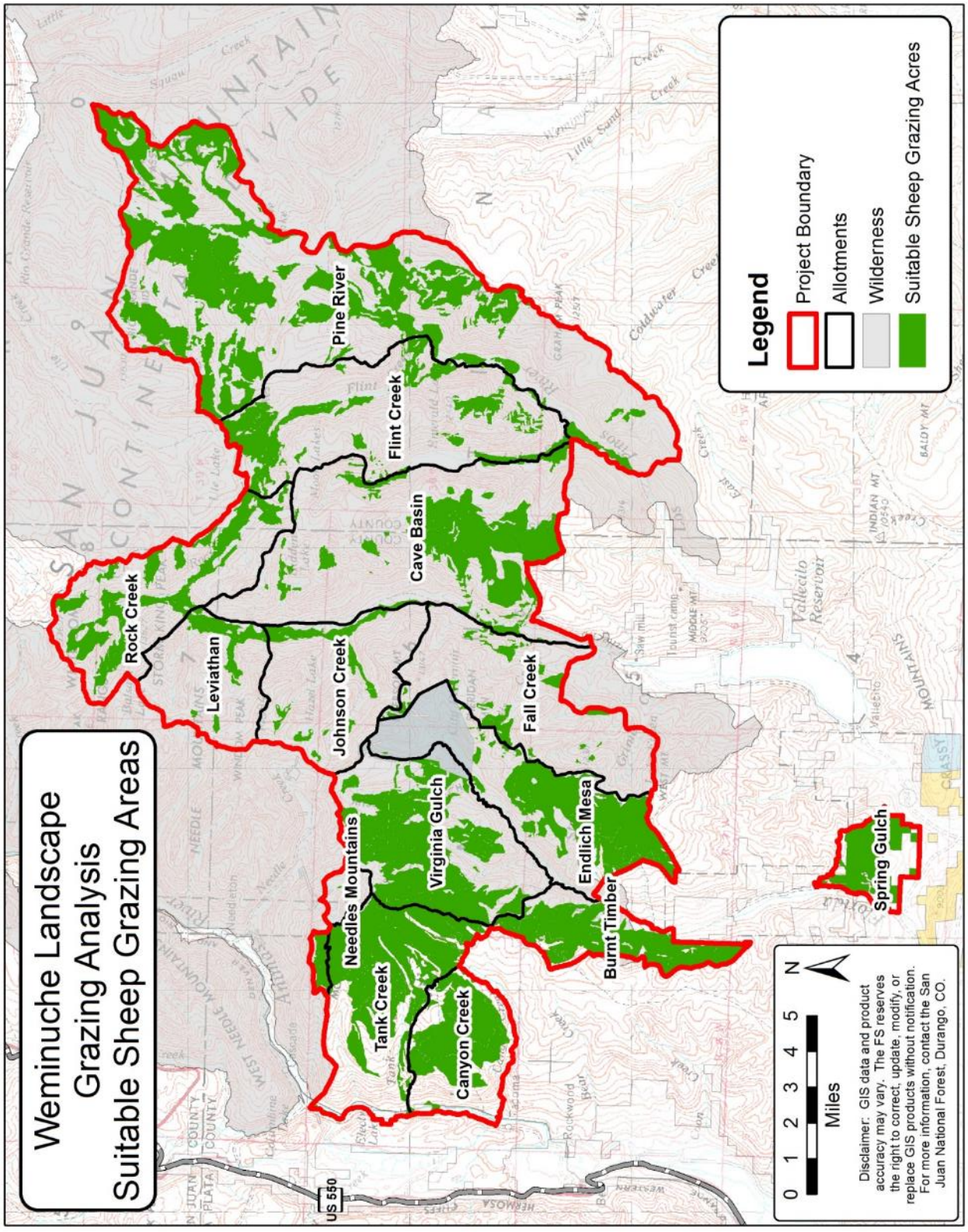
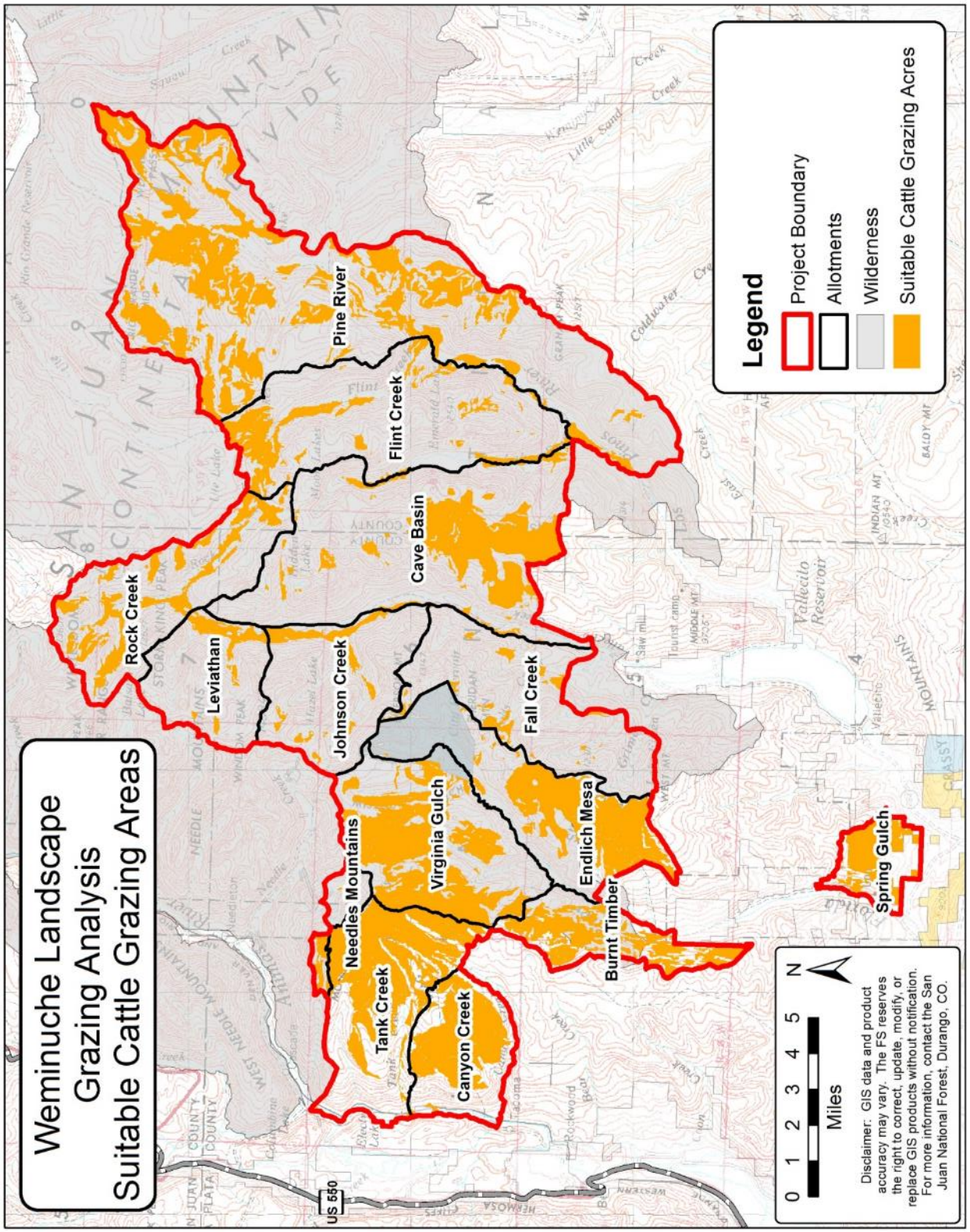


Figure 1-8. Suitable Cattle Grazing Acres



1.8.4 NEPA Analysis and Allotment Management Plans (AMP's)

While the Forest Plan establishes the general suitability of an area for livestock grazing, the decision to authorize livestock grazing on a particular area of land is the outcome of a comprehensive, integrated resource analysis for the particular allotment(s). This analysis, conducted according to NEPA, is required in order to authorize livestock grazing on the project area, to prescribe site-specific management of the rangeland resources, and to ensure management is capable of meeting or moving toward desired conditions. Analysis and associated decisions made at this level are documented in an environmental analysis document, and the appropriate decision document, and implemented through the Term Grazing Permit, Allotment Management Plan (AMP) and Annual Operating Instructions (AOI).

1.8.5 Grazing Permits and Annual Operating Instructions (AOI's)

Term grazing permits authorize a permittee to graze livestock on National Forest System lands, and are normally issued for up to a ten-year period. The permittee is required by the permit to graze under specified terms and conditions designed for resource protection and enhancement, as described in the AMP, which is incorporated as part of the permit. Permits are administered annually through issuance of AOI's. Grazing permits by themselves do not authorize the permit holder to develop water, construct fences, build roads or trails, manipulate vegetation, or do other ground disturbing activities.

1.9 BEST AVAILABLE SCIENCE

This analysis is based on the best available science, as evidenced by the following:

- Recent site-specific field inspections and reviews of the analysis area by the Interdisciplinary Team,
- Review of historic records including historic range reports, range analysis data and monitoring records,
- Consideration of current and historical bighorn sheep population trends and knowledge of die-off events,
- Extensive use of research, scientific studies and information as documented in the literature cited and references section of this document and the Bighorn Sheep Risk Assessment in the project record,
- San Juan National Forest Management Indicator Species (MIS) and Sensitive Species Assessments,
- Consultation with the State Historical Preservation Officer,
- Consultation with the US Fish and Wildlife Service and coordination with the Colorado Parks and Wildlife,
- Expert opinions of Interdisciplinary Team resource specialists, and use of most recent Geographic Information System (GIS) resource layers, and Wildlife GIS modeling.

CHAPTER 2 - ALTERNATIVES

This chapter describes and compares the alternatives considered for the Weminuche Landscape Grazing Analysis. It includes a description of each alternative considered. This section also presents the alternatives in comparative form, defining the differences between each alternative and providing a basis for choice among options by the decision maker. The official may choose any of the four alternatives in part or whole, or may choose elements from different alternatives and combine them into a modified alternative to be chosen in the decision.

Some of the information used to compare the alternatives is based upon the design of the alternative (e.g., allotments to be closed) and some of the information is based upon the environmental, social and economic effects of implementing each alternative (e.g., the effects on vegetative conditions).

2.1 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (*40 CFR 1502.14*). Public comments received in response to the action proposed during scoping did not suggest any entirely new alternatives, but several suggestions were provided.

Some of these suggestions were outside the scope of the decision space for this project or already decided by a higher-level decision. These included suggestions for such things as no grazing in wilderness areas, comments regarding elk and deer population management, and concerns with recreation management. Because these kinds of issues are beyond the scope of the decision space for this project, an alternative was not crafted to address them.

Many ideas were provided regarding what should be included as part of this analysis, such as analyses of grazing impacts on recreation, watershed conditions, impacts to wildlife, monitoring plans, and description of vegetative conditions. These kinds of items have been included in this document; there was no need to craft an additional alternative to include them.

Other suggestions were already included in one or more of the alternatives considered in detail. These included: suggestions to close grazing on the landscape or part of the landscape, with specific areas to be closed often suggested (included in Alternatives 1 and 3); and to leave vacant areas vacant instead of closing them (included in Alternatives 2 and 4).

Other suggestions were considered, but not included in any alternative for the reasons stated:

- The preceding EA proposed action included a so-called “sunset clause” for the active sheep grazing allotments which said that the permits would not be transferred beyond the current sheep permittee’s immediate family, and when/if the current permittee family decided to waive the sheep permits back to the FS, then the allotments would be closed to sheep grazing. This option was dropped from the current Preferred Alternative because the Forest Service does not have any regulatory authority to include a clause based on personal identity. Term grazing permits are granted based on availability and condition of the resources (such as forage suitability and water availability), ability to properly manage livestock, requirements for base properties, and other considerations, but not on the identity of the permit-holder or applicant.

- Prohibit grazing within a prescribed distance from the Continental Divide Trail. This suggestion would be impractical to implement on the ground. While permittees are encouraged to avoid the major recreation trails, it is not possible to manage sheep grazing to such a level of precision. There are also cases where a trail follows the only logical route of ingress or egress, which is due to the fact that many trails were originally livestock driveways before they were used by recreationists.
- We considered a forage reserve for cattle on the upper portion of the Pine River Allotment. Through scoping and internal review, this was dropped due to limited accessibility to the area, distance from cattle allotments, and high recreation conflicts. There is also concern regarding the amount of wetlands and fens in this allotment and how cattle would impact them.
- We considered the possibility of moving domestic sheep bands from currently active allotments where the risk of contact with bighorn sheep is high to other currently vacant allotments where the risk of contact with bighorns is low. However, the only vacant allotments on the Columbine District at this time are more suitable for cattle grazing than sheep grazing. The sheep permittee was offered the choice of converting to cattle and/or moving to some vacant allotments on the district. These options were unacceptable to the permittee due to additional trailing distance, different trailing routes, and increased costs. Additionally, the permittee's winter range and base property would not support change of livestock class to cattle.

  The Pagosa Ranger District has two small sheep forage reserve allotments, but does not have any vacant sheep allotments. Forage reserves could not be used on a permanent basis. The Dolores Ranger District has some vacant sheep allotments, but no recent NEPA has been done to authorize re-stocking them; additionally, the permittee is not interested in allotments which would require trucking sheep from his base property because of increased costs.

  The adjoining Rio Grande National Forest to the north may have some vacant sheep allotments, but moving Columbine sheep to them would still require either trailing through the same country they would be moving from, thus not solving the issue of bighorn risk of contact; or would require trucking, which is not a financially viable option for the permittee.

2.2 ALTERNATIVES CONSIDERED IN DETAIL

Four alternatives were considered and analyzed in detail: 1.) No Term Livestock Grazing, 2.) Current Management, 3.) Adaptive Management / Forage Reserves, and 4.) Adaptive Management / Vacant Allotments with Restocking Requirements.

Based on the effects of the alternatives, the responsible official will decide whether term livestock grazing will proceed as proposed, modified, not at all, on all or part of the Weminuche Landscape; and if so, with what associated activities, monitoring, and Design Criteria. The official may choose any of the following alternatives in part or whole, or may choose elements from different alternatives and combine them into a modified alternative to be chosen in the decision. It should be noted that this analysis and subsequent decision to be made does not apply to recreational

livestock grazing, or livestock grazing otherwise permitted, such as through an outfitter/guide permit.

2.2.1 Alternative 1 – No Term Livestock Grazing

Under this alternative, no term livestock grazing would be permitted on any of the allotments in the landscape. In this case, the Alternative 1 is synonymous with the No Action Alternative, and means that term livestock grazing would not be authorized within the project area. Following current direction, existing permits would be phased out after giving permittees notice as provided for in Forest Service policy (*FSH 2209.13*). Improvements such as corrals would eventually be removed as time and funding allow. This alternative provides an environmental baseline for evaluation of the three action alternatives.

2.2.2 Alternative 2 – Current Management

Under this alternative, term livestock grazing would continue with current AMP's or, in the absence of such, a plan, or if the existing plan is not being followed for a variety of reasons, under Annual Operating Instructions (AOI's).

Livestock grazing under a term permit would continue to be authorized as it has been in the recent past using a pre-defined number of livestock, seasons of use, and pasture rotation systems. For the allotments in this analysis, this would be as shown in Table 2-1, Figure 2-1, and Figure 2-2. All six currently stocked allotments would continue to be active and the seven vacant allotments would remain vacant. The vacant allotments would be available for permitted livestock grazing through grant and issuance of term grazing permits with stocking based on historic numbers and adjusted based on suitability on each allotment. If the FS were to choose to offer the vacant allotments for grazing, the grant process would be followed and new term grazing permits would be offered, possibly to new permittees. Canyon Creek, which is currently being grazed by cattle, could revert to sheep grazing. Furthermore, the class of livestock on any allotment could change as long as purpose and need, desired conditions, and Design Criteria are met.

Permitted livestock numbers would not change. For sheep allotments, permitted numbers refer to the number of ewes, each of which may have one or more lambs. Existing improvements would continue to be maintained as assigned in Term Livestock Grazing Permits and may be re-constructed once the useful life has been met and the need identified. New improvements would not be developed unless they are authorized in a NEPA decision. Sheep allotments typically do not have structural improvements except for corrals and loading facilities.

It should be noted that some allotment boundaries have been adjusted between the preceding EA and this EIS. This was done in order to correctly display the current condition of how the landscape is actually being used for grazing. Field verification of actual grazing patterns included using GPS collar data during the 2012-2013 field seasons for each sheep band. This allowed for allotment boundaries to be correctly identified and adjusted based on actual use data. Administrative boundary adjustments can be done at any time without a NEPA decision per 36 CFR 222.(a) (7) and FSH 2209.13 sec 16.1. This allows a more accurate representation of the current conditions for comparison to the other action alternatives.

Design Criteria

Those Design Criteria as indicated in Tables 2-2 through 2-4 (p.56+) by an "**x**" in the Alternative 2 column are included as part of Alternative 2. These criteria apply to all active allotments across the landscape at all times.

Table 2-1. Current Grazing Management by Allotment

Allotment	Grazing System	Permitted Numbers	Animal Unit Months (AUM)	Permitted Season of Use
Burnt Timber-* Canyon Creek sheep band	rotation	++	65	6/24-7/4
	rotation	++	101	9/14 - 9/30
Burnt Timber-* Tank Creek sheep band	rotation	++	76	6/25 - 7/5
	rotation	++	117	9/15 - 10/1
Burnt Timber-* Virginia Gulch sheep band	rotation	++	92	6/26 - 7/6
	rotation	++	134	9/16 - 10/1
Canyon Creek*	rotation	600	420	7/5 - 9/13
	rotation	or 120 cattle	479	7/1 – 9/30
Endlich Mesa*	rotation	700	663	7/1 - 10/4
Spring Gulch*	rotation	700	39	6/15 - 6/30
	rotation	700	62	9/22 - 10/5
Tank Creek*	rotation	700	490	7/6 - 9/14
Virginia Gulch*	rotation	850	595	7/10 - 9/15
Cave Basin	rotation	750	570	7/1 - 9/15
Fall Creek	rotation	1000	760	7/1 - 9/15
Flint Creek	rotation	950	722	7/1 - 9/15
Johnson Creek	rotation	388	295	7/1 - 9/15
Leviathan	rotation	582	442	7/1 - 9/15
Pine River	rotation	850	646	7/1 - 9/15
Rock Creek	rotation	850	646	7/1 - 9/15

*shaded parts of the table are currently active allotments

++ these are the same sheep bands as shown for the corresponding destination allotment, so numbers are not repeated.

Figure 2-1. Alternative 2 – Sheep Status

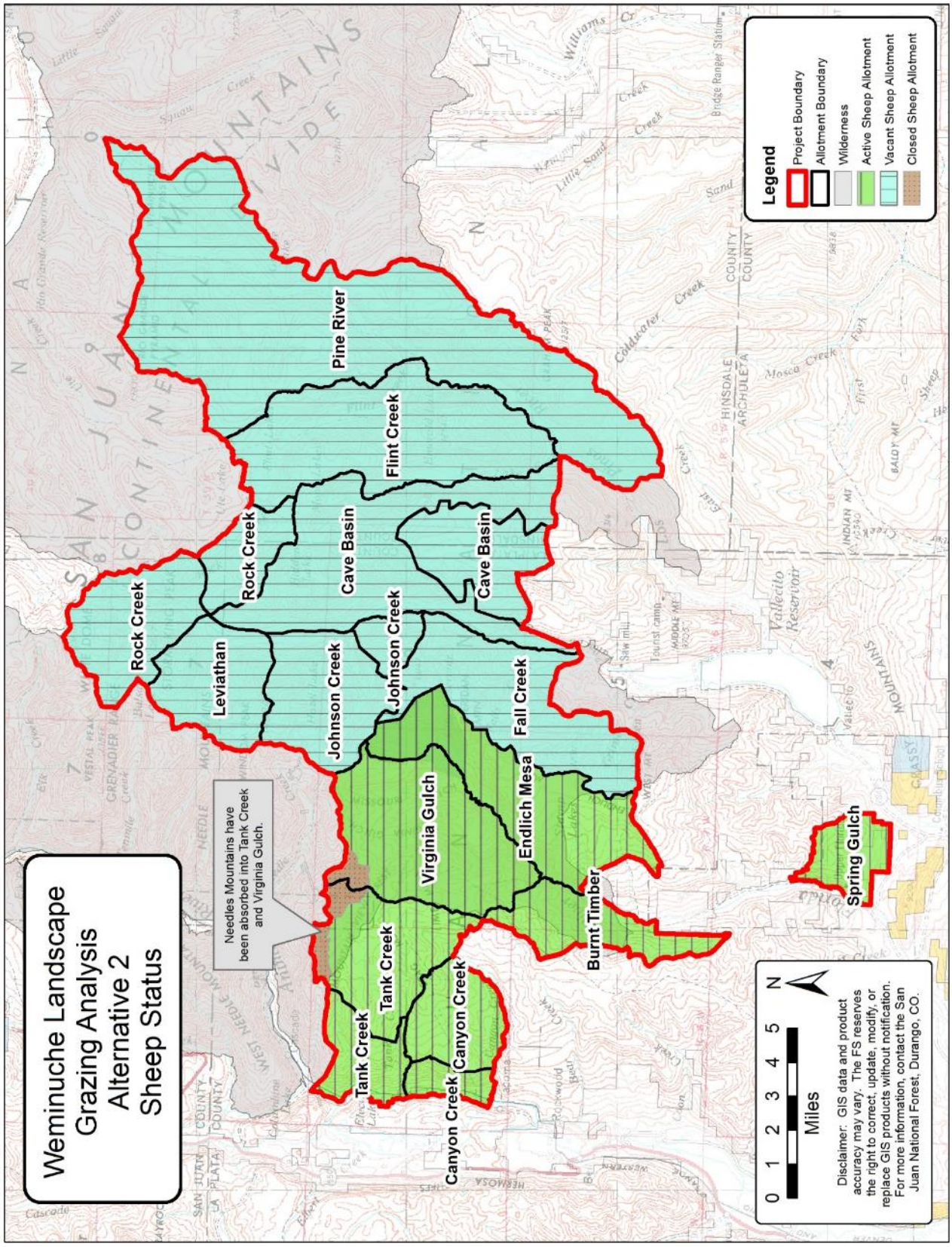
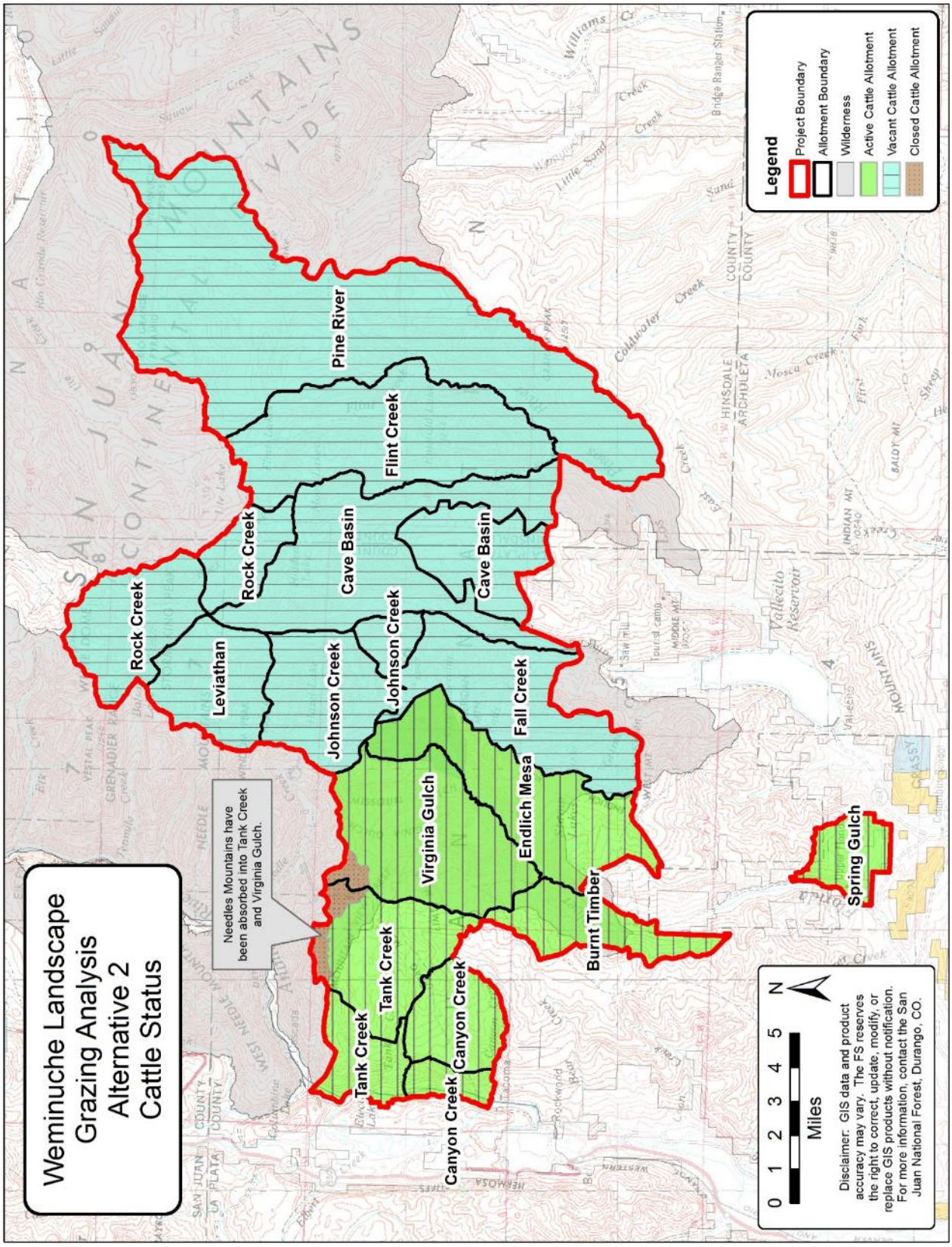


Figure 2-2. Alternative 2 – Cattle Status



2.2.3 Alternative 3 – Adaptive Management / Forage Reserves

This alternative is to continue to permit term livestock grazing on the Weminuche Landscape by incorporating adaptive management strategies that would allow the lands within the landscape to meet or move towards meeting Forest Plan desired conditions identified in this EIS. Adaptive management is a process where land managers implement management practices that are consistent with Forest Plan standards and guidelines, and would likely achieve the desired conditions in a timely manner. However, if monitoring shows that desired conditions are not being met, or if movement toward achieving the desired conditions in an acceptable timeframe is not occurring, then an alternate set of management actions, as described and evaluated under this NEPA analysis, would be implemented to achieve the desired results. Adaptive Management is designed to be flexible in nature, and is based on conditions on the ground; not regulated by fixed livestock numbers, type of livestock, or seasons of use. It can be compared to a performance-based contract that is written with specifications for the *end results*, rather than written with detailed specifications on *how* to accomplish the job. The class of livestock on any allotment could change as long as purpose and need, desired conditions, and Design Criteria are met.

Adaptive management is a set of specific initial actions that are chosen as the starting point believed to best meet or move toward desired conditions in rangeland health, vegetation composition and abundance, and watershed conditions relative to livestock grazing within the landscape, and is designed to meet Forest Plan standards and guidelines.

Alternative 3, which was presented as the proposed action during scoping, is described below (see Figures 2-3, 2-4, and 2-5). After further consideration of internal and external comments, specialist input, and other factors such as management of sheep allotments in other places around the Forest Service, the Responsible Official determined that Alternative 4 is now the proposed action, which is identified as the Forest Service Preferred Alternative.

It should be noted that some allotment boundaries have been administratively adjusted between the preceding EA and this EIS; some of those items that were proposed in the EA such as changing allotment boundaries have already been accomplished administratively. Field verification included using GPS collar data during the 2012-2013 field seasons for each sheep band. This allowed for allotment boundaries to be correctly identified and adjusted based on actual use data. This was done in order to correctly display the current conditions and how the landscape is actually being used. Administrative boundary adjustments can be done at any time without a NEPA decision per 36 CFR 222.(a) (7) and FSH 2209.13 sec 16.1.

- Alternative 3 would reissue six term grazing permits on the following currently active allotments: Burnt Timber, Canyon Creek, Endlich Mesa, Spring Gulch, Tank Creek, and Virginia Gulch.
- The western-most parts of Tank Creek and Canyon Creek would be removed from the allotments and not grazed (total of 5,116 acres) except for trailing to the allotment.
- Boundary adjustments would include adding 1,544 acres from the previously closed Needles Mountains Allotment (*SJNF 2009*) to adjacent active allotments through logical boundary shifts.
- The northern 2/3 of Rock Creek Allotment, all of Leviathan Allotment, and most of Johnson Creek Allotment would be designated as sheep forage reserves. The remaining parts of Johnson Creek and Rock Creek would be closed to term livestock grazing.

- The southern quarter of the Cave Basin Allotment would be designated as a cattle forage reserve, but closed to sheep grazing.
- Flint Creek and most of Fall Creek Allotments would be closed to all livestock grazing under term permits, along with the northern ¾ of Cave Basin Allotment.
- Incorporate Design Criteria as described below.
- Access to allotments would continue through trailing from private lands to National Forest Lands (Forest Service has no authority to authorize or deny use of private land trailing routes).

See *Section 2.5* below for more information about comparison of Alternatives 2, 3, and 4.

Forage reserve is a specific designation for an allotment on which there is no current term permit obligation, but for which a determination has been made to occasionally use the available forage on the allotment, for the purpose of enhancing management flexibility on other allotments. For this analysis, forage reserve allotments may be occasionally used by authorized livestock from another allotment when there is a loss of forage availability on the home allotment from a variety of factors such as drought, fire, rangeland restoration activities, or resource conflicts. Also for this analysis, occasional use is defined as grazing the reserve for a maximum of three years out of ten. This limitation is due to current and historical grazing conditions that preclude annual grazing on these allotments.

Under this alternative, livestock term grazing permits for forage reserves would not be granted to new applicants. Rather, preference for grazing would be given to permittees with current term grazing permits held on federal lands where documented resource conflicts exist. Generally, grazing of forage reserves is authorized through a modification of an existing term grazing permit or issuance of temporary permits. For this landscape analysis, a forage reserve would be expected to be used no more than two years out of ten, and would not exceed a total of three out of any ten year period. If use is proposed to exceed this, the Responsible Official would need to verify that conditions on the ground are appropriate for that level of use. See Design Criteria for further requirements to graze forage reserves.

All applicable standards and guidelines from the current Forest Plan would be applied, and all potential future livestock grazing would incorporate adaptive management strategies, which use monitoring and a variety of "tools," or actions, to reach or maintain desired resource conditions. The adaptive management process allows for dealing with uncertainty and changing conditions over time, and focuses on the end results of meeting or moving towards desired conditions, as opposed to detailing specific seasons of use, permitted livestock numbers, and grazing rotations. In the context of this document, this means that a course of action (Design Criteria) is selected as a starting point that is believed to best meet or move toward the desired objectives. Monitoring would occur that evaluates results which would be used by the Responsible Official to make adjustments to management as needed to ensure adequate progress toward the defined objectives. All adaptive actions would be within the scope of effects documented in this EIS.

A monitoring plan has been developed for Alternatives 3 and 4 and is outlined in *Section 2.4*. This plan was developed to ensure Design Criteria have a high probability of resulting in the desired

resource outcomes and conditions over the short and long term. Areas currently meeting desired conditions would be monitored per guidance described in the monitoring section to insure that desired conditions are maintained into the future.

Design Criteria

Those Design Criteria as indicated in Tables 2-2 through 2-4 (p.56+) by an "**x**" in the Alternative 3 column are included as part of Alternative 3. These criteria apply to all active allotments across the landscape at all times.

Site-Specific Design Criteria for Alternative 3

The Design Criteria in Tables 2-2 through 2-4 are applicable to the entire project area. During 2009-12 field analysis, some specific locations were identified as having a "need for change." These sites were determined to have a need for change if they do not currently meet the desired condition. Site-Specific Adaptive Management Options are as follows:

Burnt Timber

- No sheep bedding within ¼ mile of Burnt Timber Trail.
- Minimize the number of times sheep cross the trail.

Canyon Creek

Sheep or Cattle:

- Adjust the western boundary due to topography and vegetation, and to eliminate overlap (1,588 acres) with mapped bighorn sheep range.

Cattle:

- Cattle grazing may occur only between June 15th and October 15th.
- If Canyon Creek is used as a standalone cattle allotment:
  - A range rider for cattle would be required five days per week until fences are up and a rotational grazing system is working.
  - Fencing for cattle would be needed on the north, east, and south boundaries to prevent cattle from drifting into other allotments. An additional pasture fence may be needed to create a third pasture (see Figure 2-5), depending on the effectiveness of implementing the grazing rotation. Fencing could be electric, traditional four-wire fence, or four-wire lay-down style fence.
  - Two new stock ponds may be needed to improve cattle distribution (see Figure 2-5 for rough locations). Maintenance of existing water developments may also be needed.
  - Stocking of allotment with cattle would occur slowly over a time. Initial herd size would be 40-50 head. The herd size would be allowed to increase up to 120 head once control of cattle is demonstrated and effective three pasture rotation is established. This upper limit is based on historical numbers of livestock, acceptable vegetation conditions, and suitable acres within the allotment.
- If Canyon Creek is used as a pasture linked to neighboring Bear Creek West allotment:
  - Proposed improvements may be needed to improve distribution across the allotment.
  - High intensity, short duration grazing system may be employed.

Cave Basin

Cattle Forage Reserve:

- Boundary adjustment to reflect potential use and topographic features: only graze southern 1/3 of allotment (6,220 acres), the rest would be closed to grazing (16,232 acres).
- Cattle grazing could occur only between July 1st and October 1st.
- A range rider would be required 4 - 5 days per week to improve cattle distribution and minimize impacts to riparian areas, fens, and wetlands.
- The upper limit for stocking the forage reserve would be 200 cow/calf pairs based on historical numbers of livestock. However, the actual authorized number would be based on suitable acres within the forage reserve and rangeland conditions at the time of authorization.

Endlich Mesa

- No sheep bedding within ¼ mile of lakes (City Reservoir, Stump Lakes, Castillia Lake, Lake Marie, and Lillie Lake)
- Minimize the number of times sheep cross the trail. Try to keep sheep on one side of the trail or the other.
- Keep sheep away from trail as much as possible.

Rock Creek, Leviathan, and Johnson Creek

Sheep Forage Reserves:

- The northern 2/3 of Rock Creek Allotment (7,344 acres), all of Leviathan Allotment (6,530 acres), and most of Johnson Creek Allotment (7,780acres) would be designated as sheep forage reserves. The remaining parts of Johnson Creek (1,681acres) and Rock Creek (3,536 acres) would be closed to grazing.
- Trailing to allotments should be through Endlich Mesa or Burnt Timber and Virginia Gulch Allotments; then through Trimble Pass and Columbine Pass down to Johnson Creek then up Vallecito Creek Trail at the confluence with Johnson Creek to Rock Creek Allotment. Access is not permitted on the lower seven miles of Vallecito Trail to minimize conflicts with recreation and bighorn sheep. Sheep are to stay west of the Vallecito Trail, where possible, when travelling to/from Rock Creek Allotment to minimize conflicts with recreation and bighorn sheep.
- Only one band of domestic sheep would be allowed to use the group of forage reserves in a given year.
- Prior to use, the allotments must be aerially surveyed for a minimum of two days with one week between survey periods to minimize risk of contact to bighorns. This was agreed to be satisfactory protocol with permittees and with Colorado Parks and Wildlife.
- Salting, bedding, and intentional grazing of domestic sheep would not be permitted in a "restricted area" of the Rock Creek Allotment where suitable Uncompahgre Fritillary butterfly habitat exists.

Spring Gulch

- Re-build/improve existing water sources (5 reservoirs and 6 springs) on the allotment to improve livestock distribution. Follow Regional Best Management Practices (BMP)

direction for water developments (*USDA 2014*). If development of springs becomes a concern in the future, then trade out water source for new "road-side" style water reservoir.

- Re-open trailing routes that are overgrown due to aspen re-generation following the 2002 Missionary Ridge Fire.

Tank Creek

- Sheep are to stay west of Lime Mesa Trail and no camps within 200 yards of the trail.
- Adjust the western boundary due to topography and vegetation, and to eliminate overlap (3,528 acres) with mapped bighorn sheep range.
- Adjust northern boundary to include portions of Mountain View Crest and areas near Emerald, Ruby, and Pearl Lakes (formerly part of Needles Mountains Allotment) that are west of the Lime Mesa Trail.
- No sheep bedding within ¼ mile of lakes (Dollar, Emerald, Pearl and Ruby).
- Minimize time spent near lakes north of Mountain View Crest (Emerald, Pearl, and Ruby). If needed, spend more time on west side of Burnt Timber Allotment.

Virginia Gulch

- Grazing rotations would be designed to minimize conflict with recreation use to the extent possible in the following areas: Burnt Timber Trail, Lime Mesa Trail, City Reservoir Trail, and City Reservoir, especially during high traffic times, holiday weekends, wildflower season etc. Minimize the number of times sheep cross the trail. Keep sheep away from the trails as much as possible.
- Sheep are to stay east of Lime Mesa Trail and no camps within 200 yards of the trail.
- Adjust northern boundary to include portions of areas near Emerald, Ruby, and Pearl Lakes (formerly part of Needles Mountains Allotment) that are east of Lime Mesa Trail.

A further list of potential actions is listed in Table 2-5 (p.69). These actions could be incorporated at any time in the future to supplement those identified as Design Criteria, or to accelerate the rate at which existing conditions are moving toward the desired conditions. This list is not all-inclusive. New science and management techniques may be incorporated as needed or when they are developed. Some practices alone may not meet the desired condition, but in combination with other practices, desired conditions may be met or moved toward. For example, a two-unit deferred livestock grazing system alone may not provide the anticipated result, but when coupled with low stocking rates and construction of additional water developments, desired conditions may be met.

Figure 2-3. Alternative 3 – Sheep Status

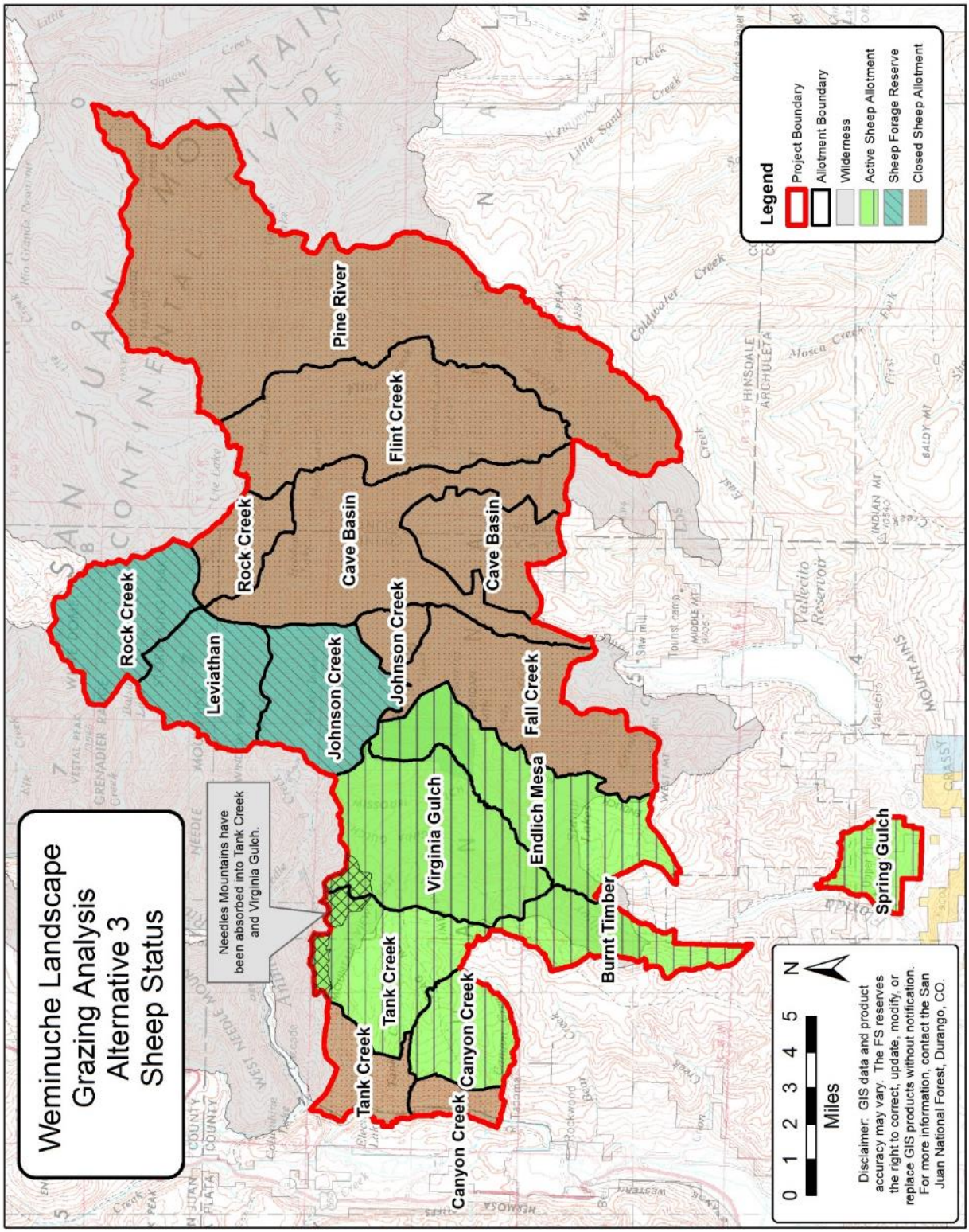


Figure 2-4. Alternative 3 – Cattle Status

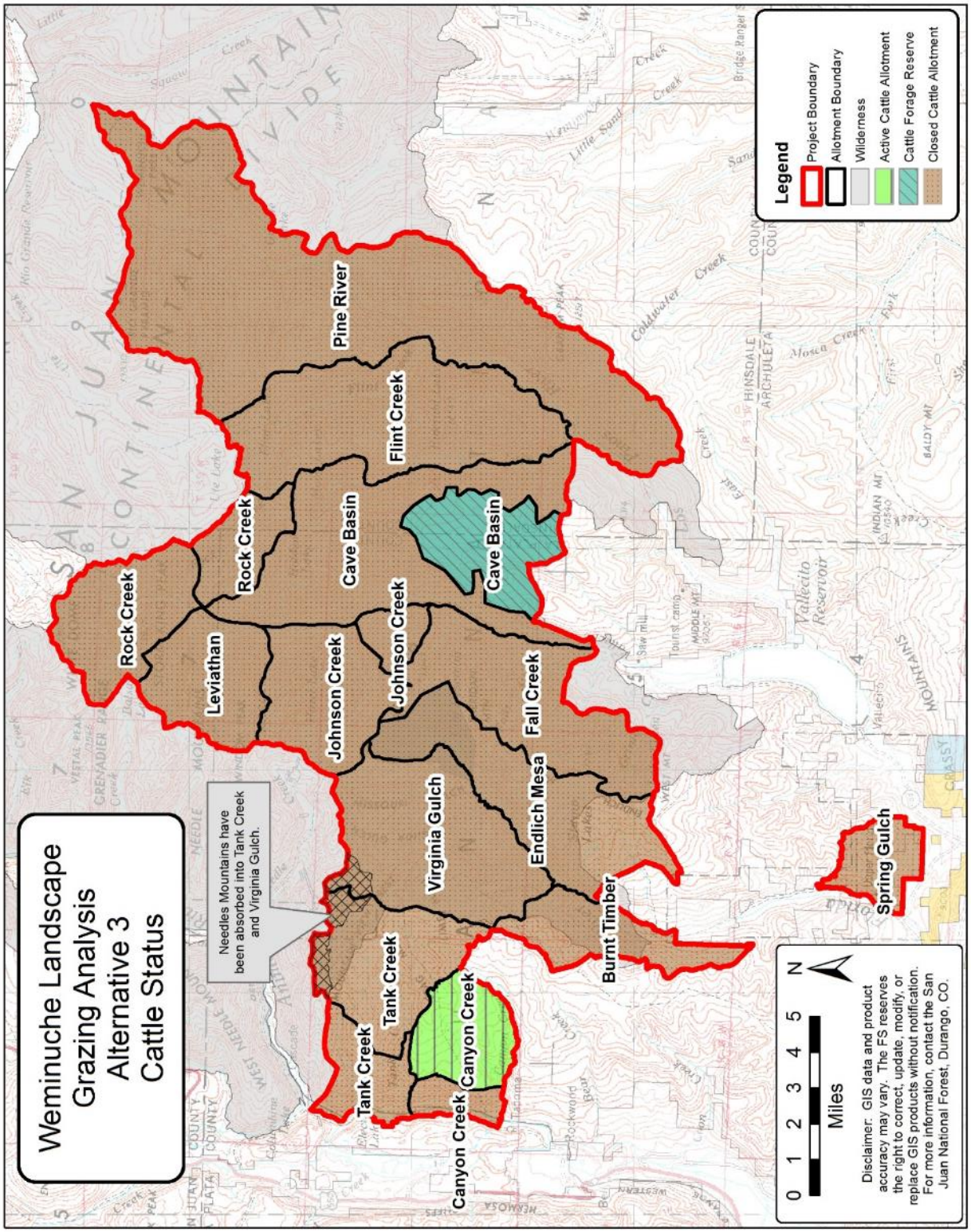
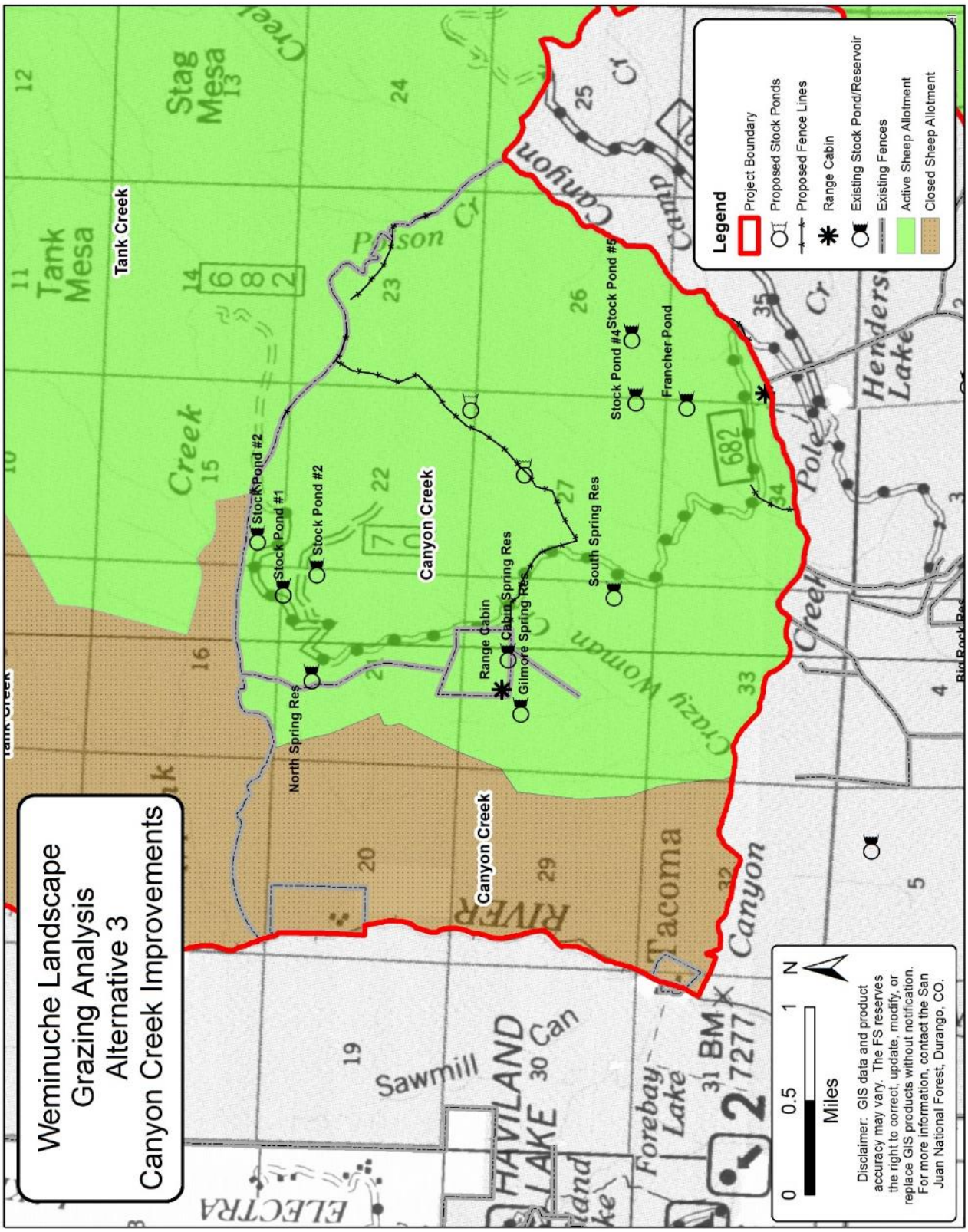


Figure 2-5. Alternative 3 – Improvements for Canyon Creek Allotment



2.2.4 Alternative 4 – Preferred Alternative - Adaptive Management / Vacant Allotments with Restocking Requirements

Three alternatives were presented during scoping. Based upon comments received through scoping and discussion within the Interdisciplinary Team process, and in order to provide more clarity and a wider range of options within the reasonable range of alternatives, a fourth alternative was added during the comment periods on the preceding EA. While Alternative 3 was presented during scoping as the proposed action at the time, and a different configuration of Alternative 4 was presented during comment periods on the preceding EA, further consideration led the deciding official to make *this* EIS version of Alternative 4 the current proposed action, which is also identified as the Preferred Alternative.

As in Alternative 3, this alternative is to continue to permit term livestock grazing on the Weminuche Landscape by incorporating adaptive management strategies that would allow the lands within the landscape to meet or move towards meeting Forest Plan desired conditions. Refer to *Section 2.2.3, Alternative 3,* for a description of adaptive management. This alternative would incorporate all the adaptive management options of Alternative 3 for the active grazing allotments (Burnt Timber, Canyon Creek, Endlich Mesa, Spring Gulch, Tank Creek and Virginia Gulch), including some boundary adjustments, trailing, and Design Criteria. No forage reserve allotments would be authorized. See Figures 2-6, 2-7 and 2-8 for maps of Alternative 4. Rationale for status of allotments and boundary adjustments, as proposed in this alternative, can be found in Table 2-2. See *Section 2.5* below for more information about comparison of Alternatives 2, 3, and 4. Adaptive options listed in Table 2-6 would also be included in this action. Additionally, the authorized type of livestock on some allotments, or portions of some allotments, is specified in this alternative.

Since the EA was converted to this EIS, a few improvements were made in the proposed action. The so-called "sunset clause" on active sheep allotments has been dropped; refer to *Section 2.1* for rationale. Additionally, information is now included regarding which allotments, or portions of allotments, would be authorized for which classes of livestock.

It should be noted that some allotment boundaries have been administratively adjusted between the preceding EA and this EIS. Field verification included using GPS collar data during the 2012-2013 field seasons for each sheep band. This allowed for allotment boundaries to be correctly identified and adjusted based on actual use data. This was done in order to correctly display the current condition of how the landscape is actually being used for grazing. Administrative boundary adjustments can be done at any time without a NEPA decision per 36 CFR 222 (a) (7) and FSH 2209.13 sec 16.1.

As the result of additional internal discussion and direction, Alternative 4 now proposes that vacant allotments would remain vacant rather than closed. Consequently, specialist reports refer to Alternative 4 as closing allotments; however, with the inclusion of the following restocking requirements, there are no anticipated changes in impacts from what was analyzed; additionally, one of the requirements is to conduct further NEPA analysis at such time as re-stocking might be proposed. The following list of requirements must occur should restocking be considered in the future.

Restocking Requirements for Vacant Allotments

- NEPA analyses with accompanying decision must be conducted. The NEPA analysis will include the appropriate level of analysis of risk of contact between bighorn and domestic sheep, and must also consider and mitigate other conflicts, such as with recreation uses and outfitters.
- Stocking can only be done when compliance with plan standards is demonstrated (e.g. preventing physical contact between bighorn and domestic sheep).
- Species viability requirements must be met.
- Pre-stocking aerial surveys will be conducted, with a minimum of two overflights within two weeks prior to stocking.
- The stocking of any vacant allotments (single allotment or any combination of vacant allotments) will not add to the cumulative risk of disease transmission to bighorn sheep.

Table 2-2. Rationale for Allotment Boundary Adjustments & Status Recommendations

Allotment Name	Proposed Status Under Alt. 4	Boundary Adjustment Notes and Status Recommendation
Burnt Timber	Active (sheep or cattle)	***Recommendation:*** Active, available for sheep or cattle grazing. ***Boundary:*** No boundary adjustments ***Rationale:*** Potential for contact between domestics and bighorn is moderate. Adequate amount of grazing available to make this a viable sheep or cattle allotment. Low enough elevation for cattle; could be used as additional pasture for adjacent cattle allotment. Improvements would be needed for cattle use.
Canyon Creek	Active (sheep or cattle)	***Recommendation:*** Active, available for sheep or cattle grazing, adjust western boundary to reflect topography. ***Boundary:*** Adjust western boundary. ***Rationale:*** Western boundary of allotment is too steep and un-usable. Boundary adjustment eliminates overlap with bighorn range. Potential for contact between domestics and bighorn goes from high to low with cattle usage. Existing improvements will need to be maintained and new fencing and waters may need to be developed to help distribution of cattle. Adequate amount of grazing available to make this a viable allotment.
Cave Basin	Vacant with Restocking Requirements	***Recommendation:*** Vacant with Restocking Requirements. ***Boundary:*** No boundary adjustments. ***Rationale:*** Allotment is in key bighorn sheep range. Potential for contact between domestics and bighorn goes from high to low with inclusion of the restocking requirements. Concerns with impacts to many wetlands and fens from any grazing.
Endlich Mesa	Active (sheep or cattle)	***Recommendation:*** Active allotment available for sheep or cattle grazing. Northern part open to sheep only, southern part open to sheep or cattle. ***Boundary:*** No boundary adjustments. ***Rationale:*** Potential for contact between domestics and bighorn is high on the allotment; conversion to cattle would address this issue. Adequate amount of grazing available to make this a viable sheep allotment, or viable for cattle in southern portion. Improvements would be needed for cattle. Could be used as pasture to adjacent cattle allotment.
Fall Creek	Vacant with Restocking Requirements	***Recommendation:*** Vacant with Restocking Requirements. ***Boundary:*** No boundary adjustments. ***Rationale:*** Potential for contact between domestics and bighorn goes from high to low with inclusion of the restocking requirements. High recreation usage corridor. Little suitable forage.
Flint Creek	Vacant with Restocking Requirements	***Recommendation:*** Vacant with Restocking Requirements. ***Boundary:*** No boundary adjustments. ***Rationale:*** Potential for contact between domestics and bighorn goes from high to low with inclusion of the restocking requirements. High recreation usage corridor. No request to use allotment in 40 years. Minimal access to allotment. Little suitable forage.

Allotment Name	Proposed Status Under Alt. 4	Boundary Adjustment Notes and Status Recommendation
Johnson Creek	Vacant with Restocking Requirements	***Recommendation:*** Vacant with Restocking Requirements. ***Boundary:*** No boundary adjustments. ***Rationale:*** Potential for contact between domestics and bighorn goes from high to low with inclusion of the restocking requirements. High recreation usage corridor. No request to use allotment in 40 years. Minimal access to allotment. Little suitable forage.
Leviathan	Vacant with Restocking Requirements	***Recommendation:*** Vacant with Restocking Requirements. ***Boundary:*** No boundary adjustments. ***Rationale:*** Potential for contact between domestics and bighorn goes from high to low with inclusion of the restocking requirements High recreation usage corridor. No request to use allotment in 40 years. Minimal access to allotment. Little suitable forage.
Pine River	Vacant with Restocking Requirements	***Recommendation:*** Vacant with Restocking Requirements. ***Boundary:*** No boundary adjustments. ***Rationale:*** Potential for contact between domestics and bighorn goes from high to low with inclusion of the restocking requirements.High recreation usage corridor. No request to use allotment in 30 years. Minimal access to allotment.
Needles Mts.	Portion Active (Sheep)	***Recommendation:*** Small portion of allotment re-opened for sheep grazing (was closed in Silverton Grazing Decision). Adjust allotment boundaries to reflect current use and topography. ***Boundary:*** Add portions to Tank Creek and Virginia Gulch Allotments. ***Rationale:*** Permittee requested boundary adjustment to reflect current use. Adjustment makes topographical sense. This small area of usage was overlooked in the previous decision; the vast majority of the Needles Mountains Allotment remains closed. Conditions are upward trend.
Rock Creek	Vacant with Restocking Requirements	***Recommendation:*** Vacant with Restocking Requirements. ***Boundary:*** No boundary adjustments. ***Rationale:*** Potential for contact between domestics and bighorn goes from high to low with inclusion of the restocking requirements. High recreation usage corridor. No request to use allotment in 40 years. Minimal access to allotment. Little suitable forage.
Spring Gulch	Active (sheep or cattle)	***Recommendation:*** Active allotment available for sheep or cattle grazing. ***Boundary:*** No boundary adjustments. ***Rationale:*** Potential for contact between domestics and bighorn is low. Could be used as pasture to adjacent cattle allotment.
Tank Creek	Active (sheep or cattle)	***Recommendation:*** Active allotment available for sheep or cattle grazing. Northern portions for sheep only, southern portion for sheep or cattle. Adjust allotment boundaries to reflect current use and topography. ***Boundary:*** Add acres from Needles Mountains Allotment (closed in Silverton Grazing Decision) to northern boundary, adjust western boundary. ***Rationale:*** Need to reflect current use by domestic sheep (requested by sheep permittee). Western boundary of allotment is too steep and un-usable. Boundary adjustment eliminates overlap with bighorn range. Potential for contact between domestics and bighorn goes from high to low with cattle usage. Northern boundary adjustment reflects current use by domestic sheep and offsets unusable western acres with usable acres. Concerns with impacts to trout in Grasshopper Creek are addressed by no cattle in the northern portion. Adequate amount of grazing available to make this a viable allotment. Southern portion is low enough elevation for cattle and could be used as pasture with adjacent cattle allotment. Improvements would be needed for cattle.
Virginia Gulch	Active (sheep)	***Recommendation:*** Active allotment available for sheep grazing, adjust allotment boundaries to reflect current use and topography. ***Boundary:*** Add acres from Needles Mountains Allotment (closed in Silverton Grazing Decision) to northern boundary. ***Rationale:*** Permittee requested boundary adjustment to reflect current use. Adjustment makes topographical sense. Adequate amount of grazing available to make this a viable sheep allotment.

Design Criteria

Those Design Criteria as indicated in Tables 2-3 through 2-5 (p.56 +) by an "**x**" in the Alternative 4 column are included as part of Alternative 4. These criteria apply to all active allotments across the landscape at all times.

Site-Specific Design Criteria for Alternative 4

The Design Criteria in Tables 2-3 through 2-5 are applicable to the entire project area. During 2009-2012 field analysis, some specific locations were identified as having a "need for change". These sites were determined to have a need for change if they do not currently meet the Desired Condition. Site-Specific Adaptive Management Options are as follows:

Burnt Timber

Grazing may occur only between June 1st and October 15th.

Sheep:

- No sheep bedding within ¼ mile of Burnt Timber Trail.
- Minimize the number of times sheep cross the trail.

Cattle:

- May use as standalone allotment or added to nearby allotments to the west as pastures (Elkhorn, Coon Creek or Bear Creek West)
- A range rider for cattle would be needed to minimize the amount of fencing to be installed due to conflicts with wilderness values.
- Up to 2.9 miles of fence may be needed to create pastures. Fencing could be electric, traditional four-wire fence, or four-wire lay-down style fence. Approximately ½ mile of fence would be added to fence off Florida and Transfer Park camp grounds to reduce conflicts with recreation.

Canyon Creek

Sheep or Cattle:

- Adjust the western boundary due to topography and vegetation, and to eliminate overlap (1,588 acres) with mapped bighorn sheep range.
- Cattle grazing may occur only between June 15th and October 15th.

Cattle:

- If Canyon Creek is used as a standalone cattle allotment:
  - A range rider for cattle would be required five days per week until fences are up and a rotational grazing system is working.
  - Fencing for cattle would be needed on the north, east and south boundaries to prevent cattle from drifting into other allotments. An additional pasture fence may be needed to create a third pasture (see Figure 2-8). Fencing could be electric, traditional four-wire fence, or four-wire lay-down style fence. (Approx. 3.9 miles).
  - Two new stock ponds may be needed to improve cattle distribution (see Figure 2-8 for rough locations). Maintenance of existing water developments may also be needed.
  - Stocking of allotment with cattle would occur slowly over a time. Initial herd size would be 40-50 head. The herd size would be allowed to increase up to 120 head once control of cattle is demonstrated and effective rotation and utilization is

established. This upper limit is based on historical numbers of livestock and suitable acres within the allotment.

- If Canyon Creek is used as a pasture linked to neighboring Bear Creek West allotment:
  - Proposed fence and water improvements may be needed to improve distribution across the allotment See Figure 2-8).
  - High intensity, short duration grazing system may be employed.

Endlich Mesa

Grazing may occur only between June 15th and October 15th.

Sheep:

- No sheep bedding within ¼ mile of lakes (City Reservoir, Stump Lakes, Castillia Lake, Lake Marie, and Lillie Lake)
- Minimize the number of times sheep cross the trail.
- Keep sheep away from the trails as much as possible.

Cattle:

- About 3.6 miles of fence running east-west may be needed just south of wilderness boundary to create a new pasture. Fences would tie into natural boundary on each end. Fencing could be electric, traditional four-wire fence, or four-wire lay-down style fence.
- This new pasture would likely be added to Lemon allotment as it is too small to be a stand- alone allotment.

Spring Gulch

Grazing may occur only between June 1st and October 15th.

Cattle or Sheep:

- Re-build/improve existing water sources (5 reservoirs and 6 springs) on the allotment to improve livestock distribution. Follow Regional BMP direction for water developments (*USDA 2014*). If development of springs becomes a concern in the future, then trade out water source for new "road-side" style water reservoir.
- Re-open trailing routes that are overgrown due to aspen re-generation following the 2002 Missionary Ridge Fire.

Cattle:

- Up to 6 miles of new fence may be needed to effectively fence off allotment for cattle. Fences would tie into natural boundary where possible. Fencing could be electric, traditional four-wire fence, or four-wire lay-down style fence. Four miles are along private boundary that is unfenced or was burned in the Missionary Ridge Fire.
- This would likely be added as a pasture to Lemon allotment as it is too small to be a stand- alone allotment.

Tank Creek

Grazing may occur only between June 15th and October 15th.

Sheep:

- Sheep are to stay west of Lime Mesa Trail and no camps within 200 yards of the trail.
- Adjust the western boundary due to topography and vegetation, and to eliminate overlap (3,528 acres) with mapped bighorn sheep range.

- Adjust northern boundary to include portions of Mountain View Crest and areas near Emerald, Ruby, and Pearl Lakes (formerly part of Needles Mountains Allotment) that are west of the Lime Mesa Trail.
- No sheep bedding within ¼ mile of lakes (Dollar, Emerald, Pearl and Ruby).
- Minimize time spent near lakes north of Mountain View Crest (Emerald, Pearl, and Ruby). If needed, spend more time on west side of Burnt Timber Allotment.

Cattle:

- About 6.5 miles of fence running east-west may be needed just south of wilderness boundary to create a new pasture. Fences would tie into natural boundary on each end. Fencing could be electric, traditional four-wire fence, or four-wire lay-down style fence.
- This new pasture would likely be added to Canyon Creek and/or Bear Creek West allotments. It is too small to be standalone cattle allotment.
- Cattle should stay south of the Grasshopper drainage due to potential conflicts with fens and Colorado cutthroat trout.

Virginia Gulch

Grazing may occur only between June 15th and October 15th.

Sheep:

- Grazing rotations would be designed to minimize conflict with recreation use to the extent possible in the following areas: Burnt Timber Trail, Lime Mesa Trail, City Reservoir Trail, and City Reservoir, especially during high traffic times, holiday weekends, wildflower season etc.
- Minimize the number of times sheep cross the trail. Keep sheep away from the trails as much as possible.
- Sheep are to stay east of Lime Mesa Trail and no camps within 200 yards of the trail.
- Adjust northern boundary to include portions of areas near Emerald, Ruby, and Pearl Lakes (formerly part of Needles Mountains Allotment) that are east of Lime Mesa Trail.

Cattle:

- No cattle grazing authorized on this allotment.

A further list of potential actions is listed in Table 2-6 (p.69). These actions could be incorporated at any time in the future to supplement those identified as Design Criteria, or to accelerate the rate at which existing conditions are moving toward the desired conditions. This list is not all-inclusive. New science and management techniques may be incorporated as needed or when they are developed. Some practices alone may not meet the desired condition, but in combination with other practices, desired conditions should be met or moved toward. For example, a two-unit deferred livestock grazing system alone may not provide the anticipated result, but when coupled with low stocking rates and construction of additional water developments, desired conditions should be met.

Figure 2-6. Alternative 4 – Preferred Alternative – Sheep Status

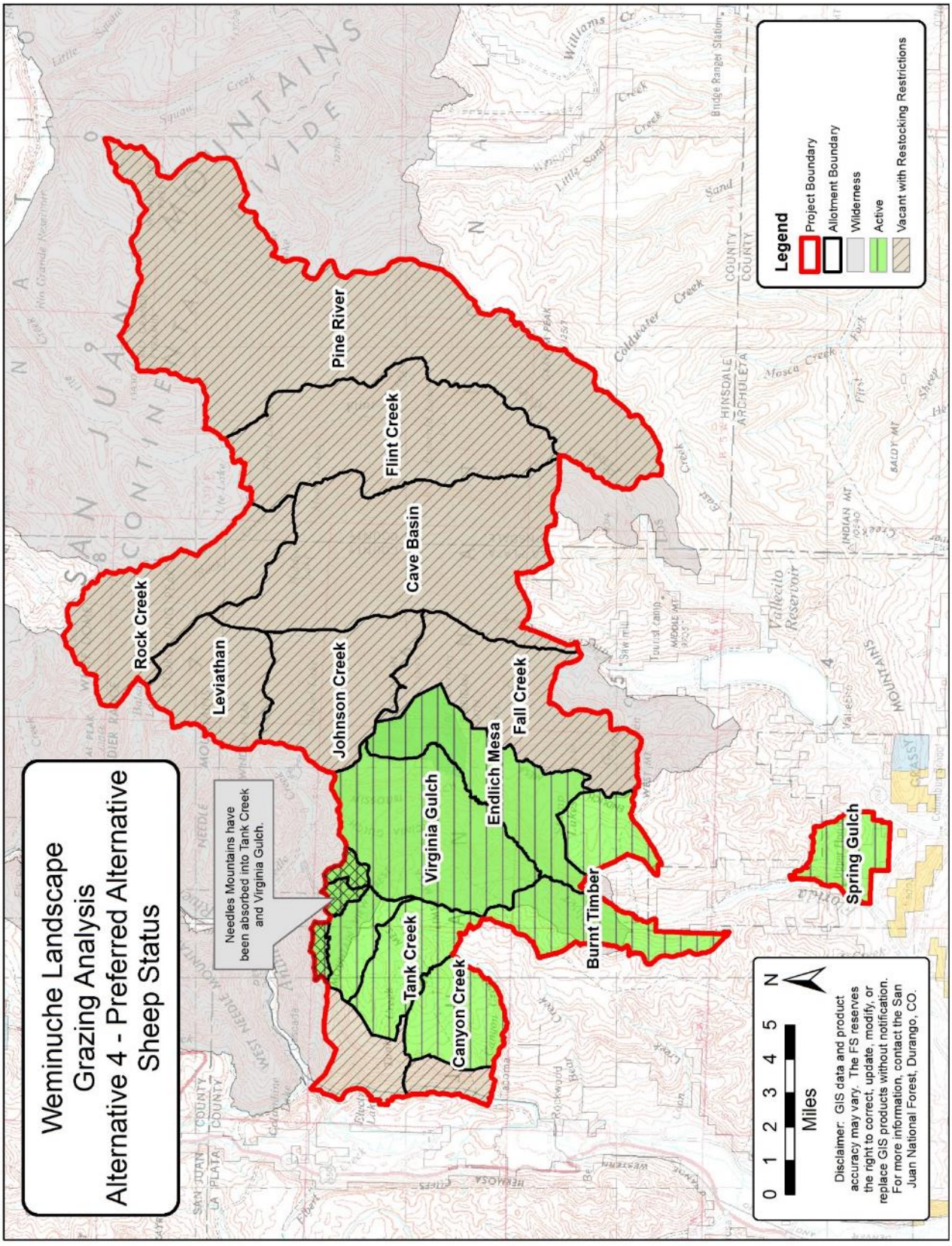


Figure 2-7. Alternative 4 – Preferred Alternative – Cattle Status

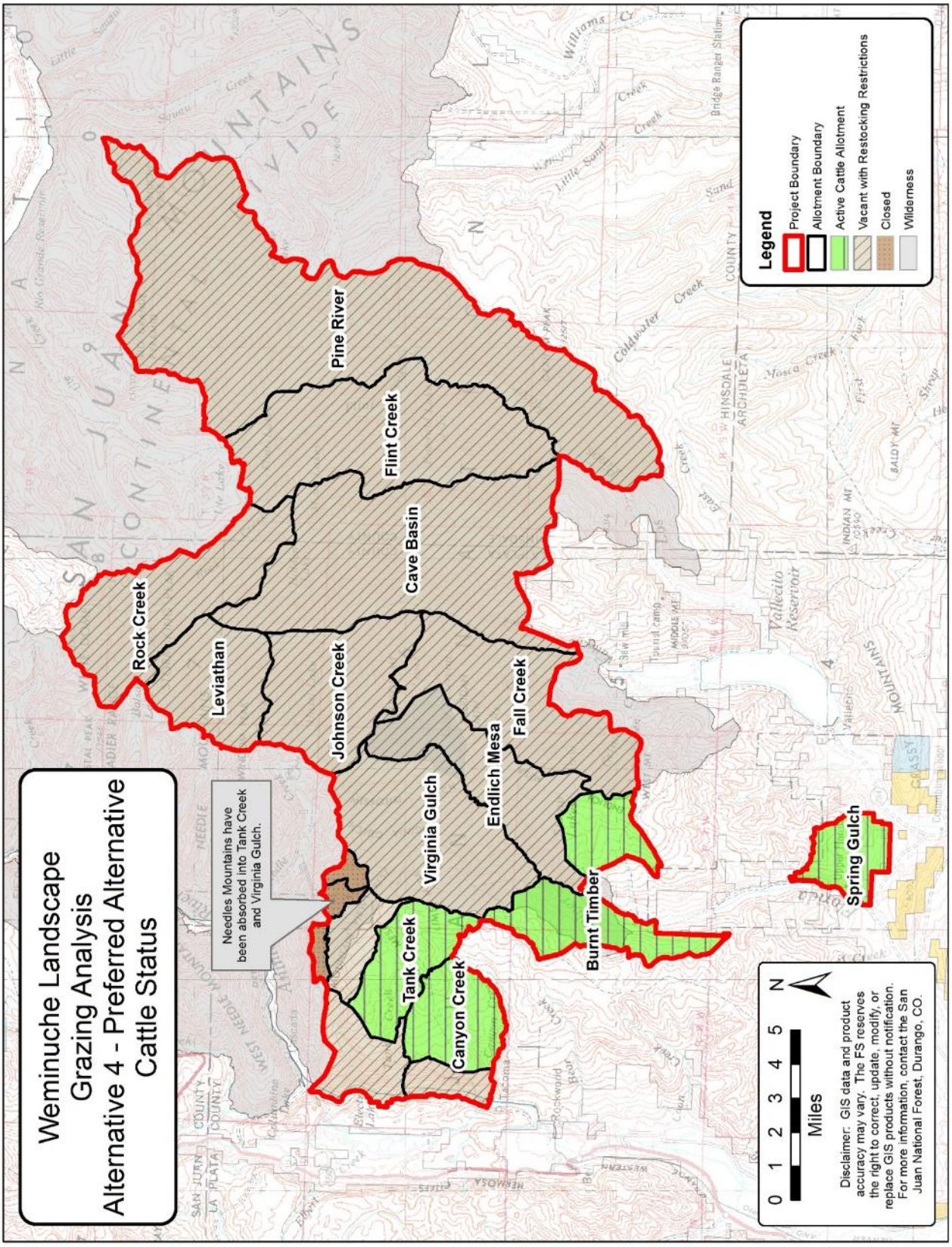
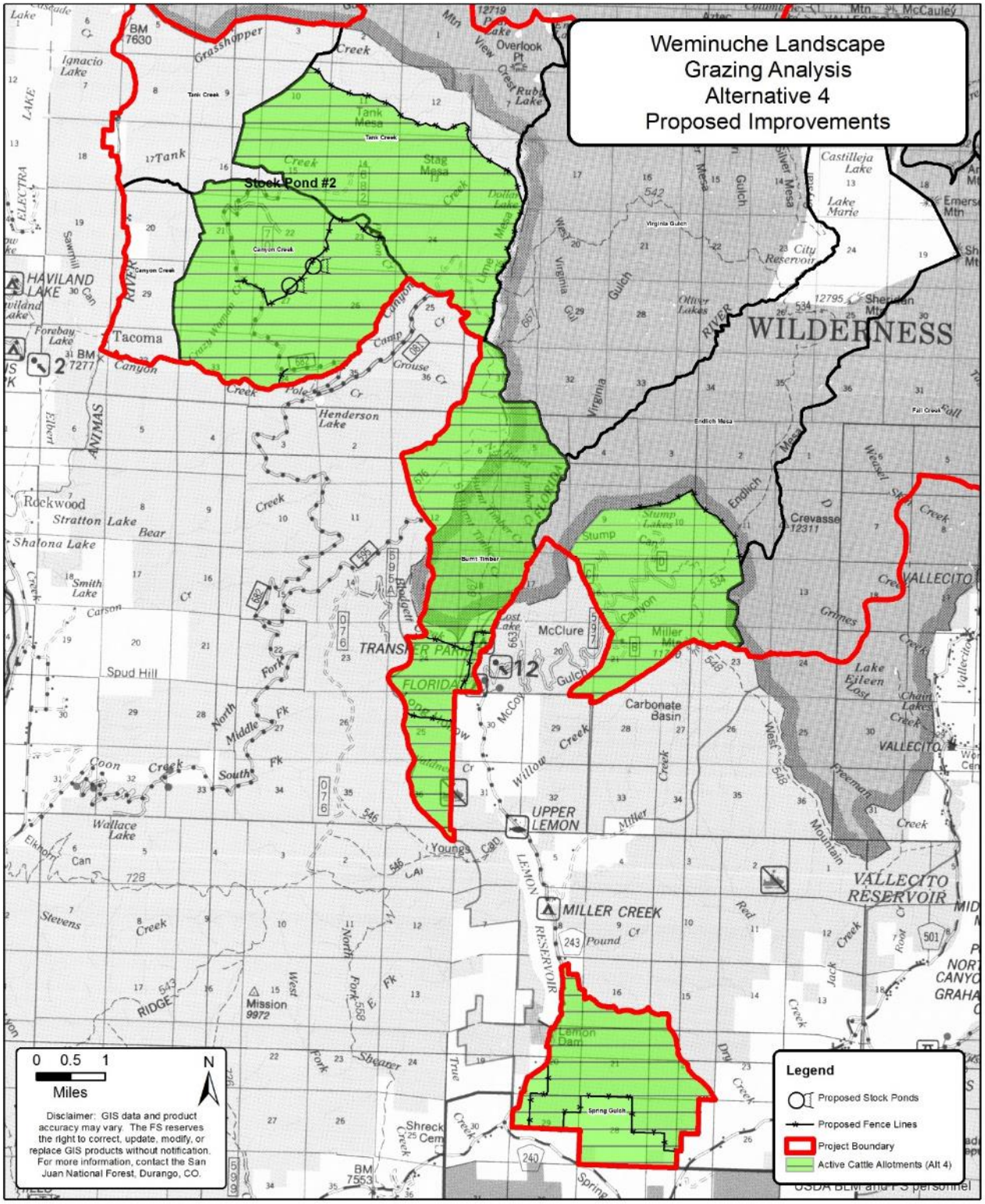


Figure 2-8. Alternative 4 – Proposed Improvements for Cattle Use



2.3 DESIGN CRITERIA FOR ALTERNATIVES 2, 3, AND 4

The Forest Service uses many measures to reduce or prevent negative impacts to the environment during the planning and implementation of management activities. The application of these measures begins at the planning and design phase of a project. These kinds of measures are variously called Best Management Practices (BMPs), Design Criteria, mitigation measures, standards, guidelines, or other similar terms. No matter which term is used, or how it is specifically defined, the intent of applying such measures is to diminish negative impacts of an action. The Forest Plan standards and guidelines, and direction contained in existing policy, such as the Watershed Conservation Practices Handbook (*FSH 2509.25*) and the Range Management Handbook (*FSM 2200*) are the first protection measures to be applied to the project. These sources are incorporated by reference and are not reiterated here. This document primarily uses the term "Design Criteria" for measures to be applied to this action, in addition to overarching policy; Design Criteria are defined for each alternative. They were developed specific to this project, as the need was identified by the FS specialists and authorized officer.

Some of the Design Criteria below have been used for years or are commonly used practices throughout the western United States and have been found to be effective in reducing potential impacts. Beside the commonly used practices, additional practices concerning the management of contact between domestic sheep and goats and Rocky Mountain bighorn sheep are included. Many of these recommended practices were taken from *Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat* (*WAFWA 2012*). These are designed with the intention of preventing physical contact between bighorn and domestic sheep.

Depending on the alternative selected, the applicable Design Criteria become a part of the project-level decision and the resultant Allotment Management Plans. The list of Design Criteria has been organized into logical categories. Each bullet statement applies to a specific action alternative as indicated by an "**x**" in the far right columns.

Alternatives 3 and 4 also have site-specific Design Criteria in addition to those listed in the following tables, as listed in this chapter above. These are listed in the descriptions of these alternatives *Sections 2.2.3* and *2.2.4*.

Table 2-3. Design Criteria for General Management of Domestic Sheep

Livestock Herding and Salting*	Alternative		
	2	3	4
Livestock will be herded using the "open herding system" and distributed across the allotment(s) in order to achieve proper grazing utilization of key forage species. *(1.1)*	x	x	x
Permittees will spend as much time as needed to move livestock away from identified areas of concern and into areas of normally light use. This allows livestock to make use of forage that otherwise will not be grazed before allowable use standards are met in the key areas and the livestock are required to be removed from the area. Sheep movements should progress around an allotment in such a way to minimize back and forth trailing over the same ground to prevent permanent visual sheep trailing impacts. *(1.2)*		x	x
At least one herder is required to be with the sheep. The main band will never be left unattended, except at night and short periods when the herder is accomplishing other tasks in the immediate area. A herder must remain in close proximity during the night. *(1.3)*	x	x	x
Move sheep to a new grazing area every 5-7 days. *(1.4)*		x	x
Wet areas with saturated soils (seasonal wetlands, snow-banks) should be avoided until they are dry enough to prevent livestock trampling impacts. *(1.5)*	x	x	x
Permittees will spend as much time as needed to move livestock away from areas of concern (meadows, riparian areas, key areas, and so forth) and into areas of normally light use, provided that such herding does not result in increased potential for contact. This benefits permittees since it allows livestock to make use of forage that otherwise will not be grazed before allowable use standards are met in the key areas and the livestock are required to be removed from a pasture. *(1.6)*	x	x	x
Livestock grazing will be managed in riparian areas and willow carrs (a wetland willow thicket) to maintain or achieve mid-seral or higher condition to provide cover and forage for prey species within Canada lynx habitat (from Ruediger *et al.* 2000). *(1.7)*	x	x	x
Livestock will not be close-herded to and from water. Livestock will be moved away from water sources after animals have finished drinking. *(1.8)*		x	x
All trailing on federal land for ingress and egress to the permitted allotment will be within the period of use specified in the permit. *(1.9)*	x	x	x
Place salt well away (>1/4 mile) from any water sources, or key areas that traditionally receive heavy use such as roads, parks, and riparian areas. Salt or supplement will not be placed near areas where such placement is liable to result in conflicts with other Forest users. Salt so that minimal amounts are left behind when livestock are rotated to the next unit. *(1.10)*		x	x
Grazing schedules will be developed so that areas are used at different times of the year if at all possible to maximize the opportunity for plant regrowth and recovery. Grazing schedules will be developed in the Annual Operating Instructions based on any or all of the following: the season of use, allowable use standard, residual stubble height, stocking rate, and timing of livestock use. *(1.11)*		x	x

Livestock Bedding	Alternative		
	2	3	4
Sheep will be bedded on new ground every 1-2 nights and moved to fresh feed daily in accordance with the current routing schedule. Permit requirements for bedgrounds allow for one night in each location. This is referring to closed bedding, or bedding when the sheep are bunched into one area. Two days use on bedgrounds is allowed if open bedding management is practiced. Open bedding is not bunching the sheep for the evening and letting them stay on the hillside where they finished grazing. Open bedding is preferred. *(1.12)*	x	x	x
Sheep will be bedded on uplands or rocky ground, where possible, but not on canyon edges or canyon rims. Sheep will be bedded no closer than 100 feet from the herder's camp (200 to 300 feet is preferred). If predators are a problem, teepee out with the sheep at night. Do not bed near water sources or recreation trails. *(1.13)*		x	x
Prevent bedding, salting, trailing, and intentional grazing on sites with high potential for Uncompahgre Fritillary Butterfly. Sites will be agreed upon in consultation with the USFWS and provided to permittees in writing in advance of the grazing season. *(1.14)*		x	x
Sheep should be bedded at least 300 feet from all water sources, including lakes, ponds, tarns, springs and seeps, system trails, campgrounds, picnic grounds, and the remains of historic structures. There may some exceptions due to topography on the allotment but these will be approved in advance by the Forest Officer. *(1.15)*		x	x
Bedgrounds in some areas may be closed or relocated in the Annual Operating Instructions on an annual basis, based on impacts. Locations of and frequency of use will be one of annual monitoring indicators. *(1.16)*		x	x
Herders will be vigilant to domestic sheep movement off of bedgrounds during the night due to lunar phase or predation. These strays will be located and returned to the band the next day. *(1.17)*		x	x

Disposal of Dead Livestock	Alternative		
	2	3	4
When an animal covered by this permit dies from any cause, including contagious or infectious disease, the carcass must be buried in a location greater than 200 feet from water, out of view of roads or trails, and away from any areas of significant public use, within 24 hours of discovery, or notification by forest personnel. Off road travel or the use of heavy equipment must be authorized by the Forest Service, in advance. The preferred method for burial is simply by the use of a pick and shovel. Carcasses may be burned under certain circumstances when authorized by Forest Service personnel on a case by case basis. *(1.18)*	x	x	x

Herder Camps	Alternative		
	2	3	4
Sheep herder camps will be moved every 5 to 10 days and regularly rotated on an annual basis. Camp Rotation may include using camps every other year and/or using half of the camps (every other camp) early in the season and then rotating through the remaining camps late in the season. *(1.19)*	x	x	x
Camps and salting areas will be not be placed in wetlands or fens and placed at least 200 feet from all surface water sources, including lakes, ponds, tarns, springs and seeps. *(1.20)*	x	x	x
Camps will be kept and left clean. All flammable refuse will either be burned or packed put. Unburnable refuse, including cans, bottles, etc., will be packed out. Native materials may be left at site (firewood, log ridgepoles, etc), but everything else must be packed out *(1.21)*	x	x	x
Camps will be placed at least 200 feet from any system trail. *(1.22)*	x	x	x
Sheep herders will not be allowed to excavate campsites. *(1.23)*		x	x
Sheep herders will not be allowed to cut krummholz (dwarf spruce trees at timberline) for firewood. *(1.24)*		x	x
All fires built for any purpose by the permittee and/or herder will not be left unattended and will be completely extinguished. Each camp will have metal stove, no burning wood outside stove during fire restrictions. Each camp must be equipped with a serviceable shovel and ax. During periods the FS has enacted fire restrictions, these restrictions will be observed. *(1.25)*	x	x	x

Working Dogs and Pack Stock	Alternative		
	2	3	4
Working dogs are used at the discretion of the livestock owner under appropriate State and County laws and regulations. The Forest Service neither permits nor authorizes the use of working dogs. If the livestock owner chooses to use working dogs, the following are best management practices for the livestock operator to avoid conflicts with people: Working dogs will be under the herder's control and must be non-threatening to recreation or other visitors. Threatening for this purpose will be defined as a dog that comes within approximately 20 feet of a person in an aggressive manner, (i.e. barking and snarling) and continues to follow the person as they attempt to retreat. This applies only if the visitor is not within the bounds of the grazing sheep band. *(1.26)*		x	x
Working dogs that do not meet the above requirements will be immediately removed by the permittee from the Forest. *(1.27)*		x	x
The permittee will utilize the minimum number of working dogs needed for effective management of sheep, including herding, predator control, and hazing of wildlife. *(1.28)*		x	x
Pack and saddle stock as allowed in the permit are to be used for management of permitted livestock only. Stock may be waived only when the entire grazing permit is waived. *(1.29)*	x	x	x

Animal Damage Management	Alternative		
	2	3	4
Animal damage management activities will be conducted in accordance with both Federal regulations and State law. Requests for assistance will be done in compliance with the current Animal and Plant Health Inspection Service (APHIS) Animal Damage Management Plan (for example, APHIS 2005) and must be in compliance with the Forest Plan. *(1.30)*	x	x	x
Predator control (i.e., black bears, mountain lions, bobcats, and coyotes) will not be conducted without following the correct State, APHIS, and Forest Service procedures. These procedures will be provided to permittees in writing (part of the Annual Operating Instructions). *(1.31)*	x	x	x
It is illegal to kill a grizzly bear, Canada lynx, wolverine, wolf, or any birds of prey. Publications will be made available to permittees to help distinguish the difference between certain protected species and several look-alike species as follows: Grizzly bear and black bear – a bear identification sheet will be given to permittees upon request. Canada lynx and bobcat – an identification sheet will be given to permittees upon request. Wolves and dogs – an identification sheet will be given to permittees upon request. *(1.32)*	x	x	x

Noxious Plants/Invasive Species	Alternative		
	2	3	4
Any hay, straw or other feeds used on the allotment will be either certified as being free of noxious plants (also called noxious weeds), or will consist of heat-treated pelletized feeds. *(1.33)*	x	x	x
Any seed used on the allotment will be tested for "all states noxious weeds" according to Association of Official Seed Analysts (AOSA) standards and will be certified by a Registered Seed Technologist or Seed Analyst as meeting the requirements of the Federal Seed Act (7 U.S.C. Chapter 37: Sections 1551-1611) and the Rules and Regulations of the Colorado Seed Act pursuant to 35-27-101 through 125, C.R.S. (1993 Supp. as amended by Senate Bill 93-17). *(1.34)*	x	x	x
Conduct prevention, control, and eradication strategies for targeted invasive plant species, utilizing integrated weed management techniques through implementation of the San Juan NF Invasives Action Plan. *(1.35)*		x	x
Permittees will make every effort to ensure that livestock do not contribute to the transport of noxious plants onto the allotment(s). Permittees will be given identification information on State of Colorado "noxious weeds" during annual meetings with the FS. The Colorado noxious weed list is available on the internet at: http://www.ag.state.co.us/CSD/Weeds/statutes/weedrules.pdf Noxious plant photos are available at: http://kiowa.colostate.edu/cwis109/noxious_weeds/Noxious_weeds.cfm *(1.36)*		x	x
Note: in addition to Project Design Criteria, the following are recommended practices that will be discussed with permittees at the time of the Annual Operating Instructions meeting with agency personnel: *Permittees are asked to help in locating noxious plant sites and reporting them to the Agency Officer. Permittees willing to assist in treating noxious plants should communicate with the Agency Officer before taking any action.* *Livestock coming onto the Forest from lands known to contain noxious plants should be held on clean forage or fed weed-free hay for several days to allow the majority of seeds to pass before turn on.* *Any equipment used in the transport of livestock, including horse trailers and stock trucks, should be washed before coming onto the allotment if they have been used in areas where noxious plants were present.*			

Access and Travel Management	Alternative		
	2	3	4
Permittees are required to abide by all FS road and trail restrictions and closures. Use of closed roads, and use of motorized equipment in areas designated as non-motorized requires a separate permit to be obtained prior to use. *(1.37)*	x	x	x

Wilderness	Alternative		
	2	3	4
Livestock management in wilderness requires special consideration of the wilderness values. Livestock will be managed within wilderness to minimize impacts on the wilderness environment and to minimize potential conflict with other users of the area. *(1.38)*	x	x	x

Information Notifications	Alternative		
	2	3	4
Provide the public information about the presence of working dogs and the "Dos and Don'ts" when recreating near domestic sheep bands. *(1.39)*		x	x
Information will be made available to the public about livestock grazing rotation schedules so that those recreation visitors who wish to, may avoid encounters with domestic sheep and the resultant activities. *(1.40)*		x	x
Signs may be placed at trailheads giving public notice of the presence of sheep herder working dogs in the Analysis Area if the Public raises the concern of working dogs in the area (posted by the FS). *(1.41)*	x	x	x

Permittee Instructions*	Alternative		
	2	3	4
Annual Operating Instructions (AOIs) will be provided concerning required management practices, so that this information can be passed on to non-English speaking/reading herders (if applicable). Permittees will be responsible for ensuring that their herders understand and comply with FS requirements. *(1.42)*		x	x
The earliest turn on date and latest removal date will be based on allotment conditions relative to wet soils or snow, range readiness, vegetative phenology, and on minimizing conflicts with other uses. These annual dates will be communicated through the AOIs. Even when these conditions are met, the dates of livestock grazing will not exceed June 15 – October15. *(1.43)*		x	x

Monitoring*	Alternative		
	2	3	4
Permittees are responsible for monitoring the following: livestock numbers; pasture entry and exit dates; allotment entry and exit dates; and maintenance activities for assigned improvements. This information will be furnished to the agency office within 30 days of livestock removal. This information will be verified by periodic agency inspections. *(1.44)*	x	x	x
Permittees will keep a weekly log of specific locations where they encounter certain species of wildlife and will turn it in to the Agency Officer upon request or at the end of the grazing season. The species to be reported will include special status species such as bighorn, lynx, wolf, wolverine, etc. *(1.45)*		x	x
Agency personnel may conduct annual permit administration consisting of monitoring compliance with AOIs, general livestock locations and use levels, plant phenology of important forage species, noxious weed mapping, soil conditions, riparian conditions and water quality, and impacts from other uses. *(1.46)*	x	x	x
Any monitoring outcome that does not meet Desired Conditions will require the application of adaptive management strategies to livestock grazing practices to recover and maintain desired conditions, when livestock are a contributing factor to the condition. See column 5 in Table 1-2 and Table 2-6. *(1.47)*		x	x
Cultural Resources	**Alternative**		
	2	**3**	**4**
All persons associated with operations under this authorization must be informed that any objects or sites of cultural, paleontological, or scientific value such as historic or prehistoric resources, graves or grave markers, human remains, ruins, cabins, mining relics, rock art, fossils, or artifacts shall not be damaged, destroyed, removed, moved, or disturbed. If in connection with operations under this authorization, any of the above resources are damaged, the proponent shall immediately suspend all operations that might further damage such materials and notify the Columbine Ranger District authorized officer. *(1.48)*		x	x
Areas of intensive activity such as salt licks, bedding areas, and herder camps will not be located within 100 feet of the boundaries of previously identified significant cultural resources. Range managers will work with archaeologists to select locations that avoid known significant cultural resources and are likely to avoid unidentified sites in areas that lack cultural resource surveys. *(1.49)*		x	x
Watershed Resources	**Alternative**		
	2	**3**	**4**
Wetlands and fens should be avoided at all times to prevent livestock trampling and grazing impacts. *(1.50)*		x	x
Sheep movement around the allotment should minimize reoccurring trailing locations to prevent soil compaction and terracing, which result in altered hydrologic function. *(1.51)*		x	x

*Note: See Table 2-4 for further instructions.

Table 2-4. Design Criteria to Prevent Contact between Bighorn and Domestic Sheep

Risk Assessments (in the project record)	Alternative 2	Alternative 3	Alternative 4
High Risk Allotments Permitted domestic sheep and goat grazing may be authorized. These allotments will be prioritized for monitoring to assess the effectiveness of Design Criteria and adaptive management tools. *(2.1)*		x	x
Moderate Risk Allotments Permitted domestic sheep and goat grazing may be authorized. However, Design Criteria and adaptive management tools will be implemented to strive to reduce the potential for contact even further. *(2.2)*			
Low Risk Allotments Permitted domestic sheep and goat grazing may be authorized. Permitted domestic sheep grazing will be focused towards these areas. However, Design Criteria should be implemented to strive to reduce the potential for contact even further. *(2.3)*			
Creating More Effective Separation Between Domestic Sheep and Bighorn Sheep	**Alternative 2**	**Alternative 3**	**Alternative 4**
Follow the response protocol for confirmed contact or threat of impending contact between permitted domestic sheep and bighorn sheep: ***Permittee*** The permittee or their agent will contact the Columbine Ranger District range personnel within 24 hours if bighorn come into contact or there is a threat of impending contact with domestic sheep. This can be accomplished via such means as Spot unit, satellite phone, DeLorme or InReach unit, etc. The chosen contact method will be tested prior to the grazing season each year. FS contact information as well as phone numbers will be included in the Annual Operating Instructions. *(2.4)* As an immediate response, the permittee and/or the herders will be authorized to haze bighorn that are threatening to make contact with domestic sheep. This will be accomplished through an agreement between the grazing permittee and the CPW. The agreement will include circumstances requiring hazing response, appropriate type of hazing and reporting requirements. *(2.5)* ***Forest Service*** When informed about potential bighorn/domestic sheep contact by a third party, the FS will contact the permittee immediately notifying them of the situation. At this point, the FS and the permittee will implement other Design Criteria if needed to prevent or reduce the threat of impending contact. At this time an alternate plan of grazing for the remainder of the season may be implemented designed to prevent the potential for physical contact to occur. Adjustments may be extended to upcoming seasons. *(2.6)* Concurrently, as confirmed contact, or the threat of contact, is made known, the FS will contact the CPW (contact information will be provided to the FS and the permittee prior to the grazing season). Actions that the CPW will take are at their discretion concerning wildlife health intervention and management of the bighorn. CPW will inform the FS if the situation is rectified and discussion/planning will occur with the permittee to implement an alternate management strategy if needed. The CPW may implement post contact monitoring. The FS will make the particular domestic sheep band (and the area) a high priority for monitoring to determine if there is bighorn activity in the area or if the risk assessment should be revisited. *(2.7)*		x	x

Creating More Effective Separation Between Domestic Sheep and Bighorn Sheep	Alternative		
	2	3	4
The FS will work with CPW to prioritize and implement coordinated annual monitoring of bighorn sheep individuals and populations. Monitoring activities could include coordinated ground counts, aerial counts, electronic data, etc. Implement a system for immediate cross-agency sharing of bighorn sighting reports to keep all parties informed about bighorn use. (*2.8*) Annually, in conjunction with CPW and the permittee, review the effectiveness of Design Criteria implementation and new information such as recent bighorn sightings. Update the allotment Risk Assessment if necessary, and make adjustments to upcoming grazing accordingly. These adjustments may include adjacent FS administrative units, depending on availability and feasibility. Feasibility includes the permittees' needs as well as the administrative availability of allotments on other administrative units. Adjustments will be focused on reducing the risk physical contact and creating more effective separation. (*2.9*) If mapped CPW bighorn summer range changes, creating overlap with domestic sheep allotments, then those allotments will be evaluated for continued grazing with modifications, or for closure (*2.10*)		x	x
Herding At least one herder is required to be with the sheep. The main band will never be left unattended, except at night, and short periods when the herder is accomplishing other tasks in the immediate area. A herder must remain in close proximity during the night. *(2.11)*		x	x
Trailing of domestic sheep will happen as much as possible during the middle of the day to avoid bighorn activity periods. In certain areas this may not be possible due to conflicts with recreational users. *(2.12)*		x	x
Sick or diseased domestic sheep and goats – pre turnout It is imperative that permittees maintain a high certainty of domestic animal health in their permitted stock. Permittees/Herders will take appropriate measures to prevent turnout of sick or diseased domestic sheep and goats. It should also be recognized that "healthy-appearing" domestic sheep and goats may still carry pathogens (harmless to them) that can be transmitted to bighorn sheep. *(2.13)*		x	x
Sick or diseased domestic sheep and goats – post turnout Injured, sick, or diseased livestock will not be left behind but will be removed or terminated and disposed of according to the "Disposal of Dead Livestock" requirements below and in accordance with State Statute. Sick or diseased animals will be removed or otherwise eliminated when identified. *(2.14)*		x	x
Sick or diseased bighorn sheep Sick bighorn sheep or carcasses must be reported as soon as possible to CPW staff or the Columbine Ranger District range personnel. FS personnel will then notify the CPW as soon as possible. *(2.15)*		x	x
Herder education It is of utmost importance that the permittees spend as much time as necessary teaching the herders the requirements attached to the grazing permit, annual operating instructions and all the applicable Project Design Criteria included here. With the implementation of "adaptive management," areas authorized for grazing as well as routing patterns and schedules may change from year to year and even within the year, along with other management techniques. Following procedures to avoid contact and prompt accurate reporting of bighorn/domestic sheep contact or impending contact is essential. Herders are crucial to ensuring proper management and in maintaining compliance to an exacting standard. Ultimately the responsibility rests upon the permittees to ensure compliance is being achieved. *(2.16)*		x	x

Creating More Effective Separation Between Domestic Sheep and Bighorn Sheep	Alternative 2	Alternative 3	Alternative 4
Salting Every effort should be made to deny bighorn access and consequent attraction to domestic sheep salting activities. Leaving available salt or excess salt residue in the soil or on rocks or tubs presents a salt source that may attract bighorn and may even train bighorn to follow the domestic sheep bands in search of salt. Salt so that minimal amounts are left behind when livestock are rotated to the next unit. *(2.17)* Blocks of salt will be allowed and, if used, will be kept with the domestic sheep at all times. Salt will not be left behind when the domestic sheep are moved. *(2.18)* Salt or supplement will be placed only on rocky knolls, well-drained sites or in timber where excessive trampling will not destroy plant growth. Salt or supplement will not be placed closer than ¼ mile to streams, springs, water developments, or other wetlands without prior approval of the Agency Officer. Salt or supplement will not be placed near trailheads, on open roads, in natural travel routes, passes, parks, meadows, in areas of concentrated public use, or in other areas where such placement is liable to result in conflicts with other public land users. Salt or supplement will not be placed within tree regeneration areas where the smallest trees are less than three feet tall. *(2.19)*		x	x
Planned domestic sheep estrus cycle The planned breeding season for the domestic sheep operation will not occur during the permitted grazing season on federal land. This is intended to reduce the potential for attraction of bighorn rams to domestic sheep ewes in estrus. *(2.20)*		x	x

Permitted domestic sheep stray management	Alternative 2	Alternative 3	Alternative 4
Accountability of Permittee Permittees will be required to begin searching for stray domestic sheep within 24 hours of notice by the Forest Service. Stray domestic sheep will be gathered or disposed as soon as they are located. A follow-up report (verbal or written) will be provided to the FS on time, date and action taken to resolve the matter; within four days from the notice given by the FS. Any stray sheep within the boundaries of an allotment are considered to be the property of the allotment permit-holder. *(2.21)*		x	x
Allotments, driveways, and trails will be revisited within 2 days of being used to ensure domestics have not been left behind. *(2.22)*		x	x
Extensive efforts will be made by the permittee to remove every authorized domestic sheep from the allotment following the grazing season. If the FS feels that appropriate efforts are not being implemented, a count-on/count-off inventory will be required as a condition of operation. *(2.23)*		x	x
Trailing Random on-site compliance monitoring to minimize strays will be conducted by the Forest Service. Trucking of domestic sheep and goats is preferred to trailing except in situations where risk of contact is possible (i.e., trucking drop off points in bighorn areas). In most cases, trucking reduces the chance of stray domestics, and lessens the chance of opportunistic contact by wandering bighorn sheep. Domestic sheep will be kept in a tight group during trailing. *(2.24)*		x	x

Permitted domestic sheep stray management	Alternative		
	2	3	4
Domestic sheep identification Permittees may be required to freshly mark (sheep paint) their sheep before they enter onto the National Forest. The FS will coordinate with the permittees annually with specific information regarding color of paint used in marking their sheep, brands used, ear tags used and colors, earmarks, and other distinguishing marks or characteristics that may be used in identifying their sheep. If a permittee does not wish to paint brand their sheep ,that permittee will be assigned a region that they will be responsible for responding to all reports of stray domestic sheep (even if it is not their sheep). *(2.25)*		x	x
Permit Action Repeated non-compliance with domestic sheep stray management will result in appropriate permit action. *(2.26)*		x	x

Table 2-5. Design Criteria for General Management of Cattle

General Design Criteria	Alternative		
	2	3	4
Meet Forest Plan guidelines in General Direction for utilization: Mainly seed reproduction - 40% on first used and 50% on last used pastures. Mainly vegetative reproduction - 45% on first used and 55% of last used pastures. *(3.1)*	x	x	x
Keep livestock distributed as evenly as possible throughout suitable rangelands within pastures or allotments. Once the utilization standard is reached, livestock must be moved to the next pasture, or in the case of the last pasture, they will be removed from the allotment. *(3.2)*		x	x
Permittees will spend as much time as needed to move livestock away from identified areas of concern and into areas of normally light use. This allows livestock to make use of forage that otherwise will not be grazed before allowable use standards are met in the key areas and the livestock are required to be removed from the area. *(3.3)*		x	x
Keep livestock in the proper pasture during the time periods specified in the Annual Operation Instructions. *(3.4)*		x	x
Wet areas with saturated soils (seasonal wetlands, snow-banks) should be avoided until they are dry enough to prevent livestock trampling impacts. *(3.5)*	x	x	x
Permittees will spend as much time as needed to move livestock away from areas of concern (meadows, riparian areas, key areas, and so forth) and into areas of normally light use. This benefits permittees since it allows livestock to make use of forage that otherwise will not be grazed before allowable use standards are met in the key areas and the livestock are required to be removed from a pasture. *(3.6)*	x	x	x
Livestock grazing will be managed in riparian areas and willow carrs (a wetland willow thicket) to maintain or achieve mid-seral or higher condition to provide cover and forage for prey species within Canada lynx habitat (from Ruediger *et al.* 2000). *(3.7)*	x	x	x
The earliest turn on date and latest removal date will be based on allotment conditions relative to wet soils or snow, range readiness, vegetative phenology, and on minimizing conflicts with other uses. See Site-Specific Design Criteria for dates pertinent to each allotment. *(3.8)*		x	x
Any monitoring outcome, when part of the ten year interval monitoring, that does not meet Desired Condition will require the application of adaptive management strategies to livestock grazing practices to recover and maintain desired conditions, when livestock are a contributing factor to the condition.*(3.9)*	x	x	x
Salt should be placed in such a way as to distribute livestock use throughout the area. Place salt well away (>1/4 mile) from any water sources, or key areas that traditionally receive heavy use such as roads, parks, and riparian areas. Salt in areas of light use to draw livestock to those areas. The best distribution can be obtained by scattering one-half block chunks in areas of light use. Salt or supplement will not be placed near areas where such placement is liable to result in conflicts with other Forest users. Salt will be picked up after livestock are rotated to the next unit. *(3.10)*		x	x
Grazing schedules will be developed so that areas are used at different times of the year if at all possible to maximize the opportunity for plant regrowth and recovery. Grazing schedules will be developed in the Annual Operating Instructions based on any or all of the following: the season of use, allowable use standard, residual stubble height, stocking rate, and timing of livestock use. *(3.11)*		x	x

Riparian Design Criteria	Alternative		
	2	3	4
Applicable management measures and Design Criteria from the Region 2 Watershed Conservation Practices Handbook will be followed. These items address the need to provide for stream health. (3.12)	x	x	x
If livestock graze a riparian area before September, the residual stubble height standard would be four inches on riparian graminoids. This assumes that in an average year, the plants would re-grow to meet the residual stubble height standard during the rest of the growing season. (3.13)	x	x	x
Once the residual stubble height standard is reached, livestock must be moved to the next pasture, or in the case of the last pasture, they will be removed from the allotment. (3.14)	x	x	x
Exclude livestock from riparian areas and wetlands that are not meeting or moving towards desired condition objectives where monitoring information shows continued livestock grazing would prevent attainment of those objectives. (3.15)	x	x	x

Noxious Plants/Invasive Species	Alternative		
	2	3	4
Any hay, straw or other feeds used on the allotment will be either certified as being free of noxious plants (also called noxious weeds), or will consist of heat-treated pelletized feeds. *(3.16)*	x	x	x
Any seed used on the allotment will be tested for "all states noxious weeds" according to Association of Official Seed Analysts (AOSA) standards and will be certified by a Registered Seed Technologist or Seed Analyst as meeting the requirements of the Federal Seed Act (7 U.S.C. Chapter 37: Sections 1551-1611) and the Rules and Regulations of the Colorado Seed Act pursuant to 35-27-101 through 125, C.R.S. (1993 Supp. as amended by Senate Bill 93-17). *(3.17)*	x	x	x

Monitoring*	Alternative		
	2	3	4
Permittees are responsible for monitoring the following: livestock numbers; pasture entry and exit dates; allotment entry and exit dates; and maintenance activities for assigned improvements. This information will be furnished to the agency office within 30 days of livestock removal. This information will be verified by periodic agency inspections. *(3.18)*	x	x	x
Agency personnel will conduct annual permit administration consisting of such actions as monitoring compliance with AOIs, general livestock locations and use levels, plant phenology of important forage species, noxious weed mapping, soil conditions, riparian conditions and water quality, and impacts from other uses. *(3.19)*	x	x	x
Any monitoring outcome, when part of the ten-year interval monitoring, that does not meet Desired Condition will require the application of adaptive management strategies to livestock grazing practices to recover and maintain desired conditions, when livestock are a contributing factor to the condition. *(3.20)*		x	x

Watershed Resources	Alternative		
	2	3	4
Wetlands and fens should be avoided at all times to prevent livestock trampling and grazing impacts. Livestock should be actively herded away from these areas. *(3.21)*		x	x
Cattle movement around the allotment should minimize reoccurring trailing locations to prevent soil compaction and terracing, which result in altered hydrologic function. *(3.22)*		x	x

Cultural Resources	Alternative		
	2	3	4
All persons associated with operations under this authorization must be informed that any objects or sites of cultural, paleontological, or scientific value such as historic or prehistoric resources, graves or grave markers, human remains, ruins, cabins, mining relics, rock art, fossils, or artifacts shall not be damaged, destroyed, removed, moved, or disturbed. If in connection with operations under this authorization, any of the above resources are damaged, the proponent shall immediately suspend all operations that might further damage such materials and notify the Columbine Ranger District. *(3.23)*		x	x
Areas of intensive activity such as salt licks, bedding areas, and herder camps will not be located within 100 feet of the boundaries of previously identified significant cultural resources. Range managers will work with archaeologists to select locations that avoid known significant cultural resources and are likely to avoid unidentified sites in areas that lack cultural resource surveys. *(3.24)*		x	x

Special Design Criteria	Alternative		
	2	3	4
Site-specific ground disturbance such as installation of water developments, pipelines, fences or exclosures will require site specific cultural and threatened and endangered species clearances. These activities may also need 404 permits *(3.25)*.		x	x

Table 2-6. Potential Adaptive Options (all classes of livestock)

Livestock Grazing Management Actions*
Possible Non-Structural Actions:
Reseed with native grass, shrub and forb species (plow and seed, or broadcast seed)
Planting native shrubs
Interseed or furrow for native grass enhancement
Fertilize existing meadows to stimulate herbaceous cover
Use of integrated methods to control noxious and/or non-native plant species (including selective herbicides, biological control agents, and mechanical methods authorized under a separate EA)
Possible Structural Actions:
Construct fence to create riparian unit – allow livestock grazing under riparian livestock grazing guidelines
Construct fence to exclude livestock from areas of concern (riparian, streams, springs, wetlands, mesic meadows, etc.)
Construct temporary electric fence to control livestock distribution patterns
Construct permanent fence to control livestock distribution patterns
Control livestock distribution patterns using water (turn water on or off at developed water sites)
Construct livestock water development (pipeline, tanks, windmill, sediment traps, well, stock dam, submersible pumps, solar)
Construct water gaps to control livestock access to riparian areas
Construct armored stream crossings
Remove existing water development (pipeline, tanks, windmill, well, stock dam)
Remove existing fence line (electric, standard, permanent or temporary)
Install barriers on trails to prevent livestock from cutting swithbacks
Possible Management Actions:
Adjust livestock grazing system (i.e. – rest rotation, deferred rotation, rest, high intensity/short duration, etc.)
Adjust use of salt or supplement to draw livestock toward or away from specific areas
Incorporate a range rider to control livestock distribution (herding)
Incorporate use of herding dogs to control livestock distribution
Adjust season of use
Adjust animal numbers
Adjust number of days of livestock utilization
Rest from livestock grazing for one or more seasons
Do not allow livestock grazing
Adjust/combine allotment boundaries and/or trailing routes
Change pasture design
Implement multiple unit rotation with permittees' private land
Do not re-issue permit when it is waived back to the FS

* Possible actions should adhere to Wilderness Structural and Nonstructural Guidelines when inside wilderness boundary.

2.4 MONITORING PLAN FOR ALTERNATIVES 3 AND 4

Monitoring and evaluation leads to improved management and informed management decisions. Monitoring helps determine how the Forest Plan and NEPA Decisions are being implemented, whether AMP implementation is achieving desired outcomes, and whether assumptions made in the planning process are valid. Monitoring and evaluation are key elements in adaptive management, allowing the Forest Service to measure the effectiveness of applied prescribed management actions and if that management is being effective in meeting or moving toward desired conditions within the appropriate timeframes. Through adaptive management, AMPs become dynamic, relevant, and useful documents. Allotments closed to grazing would receive very minimal monitoring. This plan was developed to ensure Design Criteria have a high probability of resulting in the desired resource outcomes and conditions over the short and long term.

Two types of monitoring are associated with AMPs; *implementation* monitoring and *effectiveness* monitoring. Implementation monitoring occurs at key areas and would measure whether or not permit stipulations and Forest Plan standards guidelines are being met. Effectiveness monitoring occurs at benchmark sites and would evaluate how effective management actions are at moving toward or achieving desired conditions.

Monitoring is both the responsibility of the Forest Service and range permittee. If at any time, the results of monitoring indicate guidelines, or desired resource conditions are not being achieved as predicted, then adaptive management strategies would be implemented to move towards and/or meet desired conditions.

Implementation (Short-Term) Monitoring

Annual monitoring techniques would be used in a dynamic and cyclic process. As results are received and analyzed each year, adjustments to the Annual Operating Instructions (AOI) can be made for the following year. This allows annual livestock grazing management to adapt to fluctuations in short-term factors such as range readiness, precipitation, and other local events like fire. By allowing these short-term adjustments to livestock grazing, Forest Plan Direction is likely to be met.

Range Implementation Monitoring: Allotment Inspections are typically conducted annually as part of rangeland administration (based on budget constraints). Annual monitoring includes a combination of the following, but this list may be revised should other techniques be developed that are more effective in monitoring permit compliance and desired conditions.

- *Compliance with the Terms and Conditions of the Grazing Permits:* Representative areas of the allotment are checked to verify that permittees are in compliance with the terms and conditions of their grazing permits. Included in this category of monitoring are field inspections and permittee reporting.
- *Rangeland Readiness:* Representative areas of the allotments are checked for rangeland readiness. Indicators used to determine rangeland readiness are soil and vegetation conditions. Rangeland is generally ready for grazing when soil has become firm after winter and spring precipitation, and when plants have reached the defined stage of growth at which grazing may begin under the specific management plan without long-lasting damage.

- *Compliance with Annual Operating Instructions (AOI):* The AOI's explain how each allotment is to be managed on a year-to-year basis. These instructions become part of the Term Grazing Permit for each permittee and responsibility for carrying out the instructions falls to the permit holder. The AOIs include instructions for routing schedules, numbers to be grazed, entrance and exit dates, standards for and determination of allowable use, improvement maintenance needs, improvement construction and re-construction, and general allotment operating procedures. AOI's could include adaptive management options based on items identified during monitoring.
- *Domestic Sheep GPS Collar Data:* As part of implementation monitoring, since 2012, four GPS collars have been rotated through the various sheep allotments on the Columbine Ranger District. This information has been used to verify trailing routes, to update allotment boundaries, and verify that allotment rotation schedules are being followed. This information has allowed the District and the permittee to work together to improve distribution across the allotments and to improve day to day management of the sheep herds on the allotments. It is anticipated to continue this monitoring into the future.
- *Allowable Use Guides:* Allowable use monitoring methods typically used have been ocular estimates on key areas. This method provides ocular estimates of upland herbaceous species within one of six utilization classes. Allowable use monitoring in riparian areas measures stubble height.
- *Actual Use Reports*: Permittees are responsible for reporting actual use of the allotment at the end of each livestock grazing season. When combined with analysis of other factors such as allotment inspections, the need for annual adjustments to livestock grazing strategy can be determined.
- *Utilization Surveys:* Common forage utilization monitoring methods used consist of employing utilization gauges or ocular estimates. In addition, riparian stubble heights would be visually assessed (4-6 inch trigger point) to assure that stream bank conditions are not deteriorating. Shrubs and saplings would also be visually assessed to ensure they are not over-utilized by domestic sheep during dormancy. This may be accomplished by annual on-the-ground inspections (including photo points) that document current conditions (measure of riparian health).

Effectiveness (Long-Term Trend) Monitoring

Role of Effectiveness Monitoring: An important role of monitoring is to determine whether management and identified Design Criteria are successful at moving rangeland resources towards desired conditions. Determining trend toward or away from allotment desired condition objectives allows rangeland managers to determine the relative success of the management system and to adjust management to accomplish objectives.

What Would be Monitored and Where: The long-term health of riparian and upland herbaceous resources would be monitored at benchmark areas selected by the Responsible Official. These sites may be key areas or other primary range sites where resource concerns have been identified or where resource concerns have arisen due to changing ground conditions as noted from annual monitoring results. Long-term trend monitoring would not be conducted if the allotments are not stocked, or for temporary grazing permits.

Monitoring Methods and Frequency: The long-term health of riparian and upland vegetative resources may be monitored at benchmark sites on each allotment using one or more of the following methods as needed. All methods listed are approved methods described in the Region 2 Rangeland Analysis and Management Training Guide (*USDA 1996*). The list below may be revised should other techniques be developed that are better at monitoring the effectiveness of Design Criteria.

- *Rooted Nested Frequency Transects (1 out of 10 years):* Rooted Nested Frequency transects would be established at benchmark sites within the analysis area as needed. Rooted Nested Frequency transects analyze changes in frequency of individual species over time on a specific site. Increases or decreases in frequency of species within the plant community can be monitored. An increase in a species that is sought-after in the desired plant community can be interpreted as desirable or trending toward the desired plant community. A decrease in a sought-after species can be interpreted as undesirable and considered trending away from the desired plant community.
- *Cover-Frequency Transects (1 out of 10 years):* These transects are used to monitor changes in canopy cover and relative frequency of herbaceous species. This method provides estimates of canopy cover by species, frequency, ground cover, and production by life form through replicated sampling of plot frame transects. Combining cover and frequency data helps overcome variability in the data due to climate changes. This method is mostly used to determine change in composition over time.
- *Rangeland Health Evaluation Matrix (1 out of 10 years):* This evaluation gives the examiner a general look at critical rangeland health features. Qualitative evaluation of these features can lead the examiner towards an accurate initial assessment of the rangeland and subsequent management of that land. Comparison of future rangeland health evaluations to initial evaluations provides a glimpse of trend in overall rangeland health as evidenced by a series of health indicators.
- *Photographs and Photo-points (1 out of 10 years)*: Photographs are extremely useful in documenting change on the landscape. Photos should capture the essence of the plot, point or transect, including important characteristics and features of the site. Photos need to include enough of the horizon-line to allow the photographer to easily repeat the photograph from the same angle at a different time.

The long-term health of ***riparian areas*** would be monitored at riparian sites on active allotments at approximately at varying intervals using a variety of methods, such as:

- *The line intercept method (1 out of 10 years): This method* consists of horizontal linear measurements of plant intercepts along the course of a line (tape). It is used primarily for quantitative measurements of shrub canopy cover, and is used to calibrate ocular estimates of shrub canopy cover. This method would be used to determine the canopy cover percent of willows needed to determine seral stages.
- *Cover Frequency Transects (1 out of 10 years):* This inventory method provides quantitative measurements of canopy cover and frequency by plant species, ground cover, and production by life form. It is useful when a replicated sampling design and statistical analysis is required. It is also used to calibrate ocular estimates of canopy cover.

- *Proper Functioning Condition (PFC) (1 out of 10 years):* This assessment process classifies riparian as being in "Proper Functioning Condition"; "Functional-at risk", with either an upward or downward trend; "Non-functional"; or "Unknown." These ratings evaluate riparian condition based in part on presence/absence and abundance of specific vegetation and the interactions of that vegetation with geology, hydrology, and soils.
- *Photographs and Photo-points (1 out of 10 years):* Photographs are extremely useful in documenting change on the landscape. Photos should capture the essence of the plot, point or transect, including important characteristics and features of the site. Photos should include enough of the horizon-line to allow the photographer to easily repeat the photograph from the same angle at a different time.
- *Green Line Vegetation Composition (1 out of 10 years):* This method samples community type composition along edges of live water. There is a strong relationship between amount and kind of vegetation along the water's edge and bank stability. This method provides a good indication of the general health of the riparian system.

Bighorn Sheep Monitoring

Monitoring efforts should be coordinated with Colorado Parks and Wildlife (CPW) and the Pagosa Ranger District, due to bighorn distribution across administrative boundaries. The following efforts are currently being planned:

- GPS collaring of bighorn sheep in a cooperative effort between CPW and FS personnel. The FS will conduct the needed analysis to capture bighorns in the wilderness using helicopters.
- Coordinated ground counts with CPW and FS personnel.
- GIS database with all radio collar data (bighorn and domestic sheep) to include available data from the Rio Grande, Grand Mesa, Uncompahgre, and Gunnison National Forests.
- GPS collars on domestic sheep, as noted above.

Active Sheep Allotments (Alts 3 and 4):

Presence/absence monitoring within each active allotment should continue as long as an allotment remains active *(1 out of 5 years).* If bighorn sheep are detected at any point, a determination would be made if Design Criteria are sufficient to prevent physical contact between domestic sheep and bighorns. If it is determined that Design Criteria are not adequate to prevent physical contact, then measures would be utilized (adaptive management options) to prevent physical contact, which could include adjustment of allotment boundaries, or closing allotments to domestic sheep grazing.

Forage Reserve Sheep Allotments (Alt. 3 only):

Bighorn sheep surveys would be conducted on forage reserve allotments prior to stocking to determine presence or absence of bighorn sheep, and on an annual basis if allotments are stocked. At least two months written notice must be given by requesting permittee to allow enough time for required surveys to be completed. Design criteria and adaptive management assessments would be the same as for active sheep allotments.

Application of Monitoring Results through Adaptive Management

If the results of implementation or effectiveness monitoring determine that the desired conditions of riparian and/or upland herbaceous resources are not being met, and satisfactory progress is not occurring in moving toward the desired conditions, the Interdisciplinary Team would determine which management actions identified in the Design Criteria are ineffective. The Team would then determine which adaptive management technique(s) could be implemented to reverse the undesirable trend, and which the Team believes would begin moving the site resource(s) of concern towards the desired conditions. The Interdisciplinary Team would make its recommendations to the Responsible Official who, after discussions and input from the affected permittee, would decide what action(s) should be taken. The effectiveness monitoring cycle would begin again to monitor the implementation and effectiveness of the newly applied adaptive management actions. Adaptive management options that may be used listed in Table 2-6 (p. 69).

2.5 COMPARISON OF ALTERNATIVES

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Table 2-7. Comparison of Alternatives Based on Key Issues

Issues	Indicator for Comparison	Alternative 1 No Term Livestock Grazing	Alternative 2 Current Management	Alternative 3 Adaptive Management/ Forage Reserves	Alternative 4 Adaptive Management / Vacant Allotments with Restocking Requirements
Natural Resources Impacts (Generalized)	**Qualitative Description (Generalized)**	Best: Eliminates impacts from grazing	Worst: No Change	3rd Best: Decreased impacts compared to current	2nd Best: Most decrease in impacts compared to current
Water Quality/ Soils Impacts	**Riparian Monitoring**	None for grazing purposes	Infrequent PFC	PFC at ~10 yr. intervals	PFC at ~10 yr. intervals
	Design Criteria to be Implemented	None	No Design Criteria	Design Criteria to reduce water impacts	Design Criteria to reduce water impacts
Vegetation/ Impacts	**Acres Open for Grazing (Total in Allotments)**	0 acres	165,084 acres (active or vacant allotments): 6 active, 7 vacant	73,475 acres (active or forage reserves allots): 6 active, 4 forage reserves	45,601 acres: 6 active allotments
	Upland Monitoring	None for grazing purposes	Infrequent monitoring	RHM at ~10 yr. intervals; Quantitative at ~ 10 yr. intervals	RHM at ~10 yr. intervals; Quantitative at ~ 10 yr. intervals
	Design Criteria to be Implemented	None	None	Design Criteria to reduce veg impacts	Design Criteria to reduce veg impacts
Recreation Impacts	**Monitoring**	None for grazing purposes	Informal monitoring	Establish Photopoints	Establish Photopoints
	Design Criteria to be Implemented	None	Avoid Burnt Timber Trail	Avoid key trails; Other Design Criteria to reduce conflicts	Avoid key trails; Other Design Criteria to reduce conflicts
Wildlife Impacts	**Design Criteria**	None	None	Bighorn Design Criteria (Table 2-4)	Bighorn Design Criteria (Table 2-4)
	Acres Open to Grazing in Bighorn CHHR	0 acres	46,053 acres (active or vacant allotments)	0 acres (active or forage reserve allotments)	0 acres
	Relative Risk of Domestic-Bighorn Contact	Lowest	Highest	Second-Highest	Second-Lowest
Socio-Economic Impacts	**Present Net Value**	$0	-$39,163	-$39,163	-$122,711
	Qualitative Description	Ranching families out of business	No change	Increased costs of grazing implementation and administration	Increased costs of grazing implementation and administration
Cultural Resource Impacts	**Design Criteria to be Implemented**	None	None	Design Criteria to reduce cultural impacts	Design Criteria to reduce cultural impacts

Table 2-8. Comparison of Allotment Acreage and Status for Alternatives 2, 3, & 4.

Allotment	Alternative 2		Alternative 3		Alternative 4	
	Acres prior to boundary adjustments	Current Status	Acres after boundary adjustments	Proposed Status	Acres after boundary adjustments	Proposed Status
Burnt Timber	5092	Open/Active – sheep or cattle	5,092	Open/Active – sheep only	5,092	Open/Active - sheep or cattle
Canyon Creek	6,328	Open/Active - sheep or cattle	4,740	Open/Active - sheep or cattle	4,740	Open/Active - sheep or cattle
			1,588	Closed	1,588	Open/Vacant- w/Restocking Requirements
Cave Basin	22,452	Open/Vacant- sheep or cattle	6,220	Forage Reserve – Cattle only	22,452	Open/Vacant- w/Restocking Requirements
			16,232	Closed		
Endlich Mesa	11,222	Open/Active - sheep or cattle	11,223	Open/Active – sheep only	N 2/3 (8,126)	Open/Active - sheep only
					S 1/3 (3097)	Open/Active - sheep or cattle
Fall Creek	11,385	Open/Vacant- sheep or cattle	11,386	Closed	11,386	Open/Vacant - w/Restocking Requirements
Flint Creek	16,359	Open/Vacant- sheep or cattle	16,359	Closed	16,359	Open/Vacant- w/Restocking Requirements
Johnson Creek	9,461	Open/Vacant- sheep or cattle	7780	Forage Reserve – Sheep only	9,461	Open/Vacant- w/Restocking Requirements
			1,681	Closed		
Leviathan	6,530	Open/Vacant- sheep or cattle	6,530	Forage Reserve – Sheep only	6,530	Open/Vacant- w/Restocking Requirements
Needles Mountains	1544	Closed	Acres included in adjacent allot.s	n/a	Acres included in adjacent allot.s	n/a
Pine River	38,843	Open/Vacant- sheep or cattle	38,843	Closed	38,843	Open/Vacant- w/Restocking Requirements
Rock Creek	10,880	Open/Vacant- sheep or cattle	7,344	Forage Reserve – Sheep only	10,880	Open/Vacant- w/Restocking Requirements
			3,536	Closed		
Spring Gulch	3,077	Open/Active - sheep or cattle	3,077	Open/Active – sheep only	3,077	Open/Active - sheep or cattle
Tank Creek	10,884	Open/Active - sheep or cattle	8,356	Open/Active – sheep only	N 1/2 (3490)	Open/Active - sheep only
					S 1/2 (4866)	Open/Active - sheep or cattle
			3,528	Closed	3,528	Open/Vacant- w/Restocking Requirements
Virginia Gulch	12,571	Open/Active - sheep or cattle	13,113	Open/Active – sheep only	13,113	Open/Active - sheep only
Total Available for Grazing	**49,174 acres open/active + 115,910 acres open/vacant =165,084 TOTAL**	**6 open 7 vacant**	**45,601 acres open/active + 27,874 acres forage reserve = 73,475 TOTAL**	**1 open sheep or cattle 5 open sheep only 3 sheep forage reserves 1 cattle forage reserve**	**45,601 acres open/active**	**1 open sheep only 2 portions open sheep only 2 open sheep or cattle 1 portion open sheep or cattle**
Total Unavailable for Grazing	**1544**	**1 previously closed**	**93,153 acres closed**	**3 closed 6 portions closed**	**121,027 acres vacant with requirements**	**7 vacant with requirements 2 portions vacant w/ requirements**
Total Acres	**166,628**		**166,628**		**166,628**	

CHAPTER 3 - AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Council on Environmental Quality regulations direct agencies to succinctly describe the environment that may be affected by the alternatives under consideration (*40 CFR 1502.15*). As such, this chapter summarizes the physical, biological, social, and economic environments of the project area and the effects of implementing each alternative on that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in Table 2-7 (p.75).

The following chapter is organized by resource area to address issues that were raised during scoping (e.g. Vegetation, Recreation, and Watershed). Resources for which there were no issues are not discussed (e.g. Air Quality). Each resource section begins with a description of the Affected Environment, or the existing conditions. Then, each section provides an analysis of direct and indirect effects, or Environmental Consequences, of implementing each alternative. Direct effects are caused by the action and occur at the same time and place. Indirect effects are caused by the action and occur later in time or are removed in distance. Differences in impacts between alternatives are emphasized, focusing on impacts related to the issues identified *Chapter 1*.

Each resource section then describes Cumulative Effects, which are the direct and indirect effects of the project added to the effects from other past, present, and reasonably foreseeable actions. It should be noted that this analysis area is 85% wilderness, which limits the type and amount of activities allowed, thus there are few management actions in the landscape to be considered in Cumulative Effects sections. Natural or global-scale events are usually not considered Cumulative Effects because they are not management actions, but some are worth mentioning because their consequences have impacts on the environment and could be interrelated with grazing. See this discussion in *Section 3.16*.

Two time frames are referred to throughout this analysis, short-term and long-term. Short-term is for a ten year period and long term is considered beyond ten years.

There are no designated Wild and Scenic Rivers, prime farmlands, or parklands in the project area; therefore, there will be no impacts to these resources from any of the alternatives, and these resources are not discussed further. Although the Pine River and its tributaries are determined to be eligible for Wild and Scenic designation (*SJNF 2013*), the watershed analysis has revealed that grazing is not impacting watershed conditions and therefore is not affecting the characteristics of those river segments.

3.1 RANGELAND MANAGEMENT

Affected Environment

The analysis area encompasses five active sheep allotments, one active cattle allotment, seven vacant sheep allotments, and a small portion of the Needles Mountains Allotment (area previously closed in the Silverton Sheep Grazing analysis) on the Columbine Ranger District. These 13 allotments cover approximately 166,628 acres (162,573 acres of National Forest System lands).

Of the 162,573 Forest Service acres, 59,581 are considered capable rangelands for sheep and 51,292 acres for cattle. Capable rangelands means that they are accessible, have inherent forage producing capabilities, and can be grazed on a sustained yield basis without damage to the forage resource under reasonable management practices. Rangeland capability does not vary by alternative, and is therefore not discussed further in this document.

Rangeland suitability refers to the appropriateness of applying certain resource management practices to a particular area of land, and may vary by alternative. A project-specific suitability analysis (an analysis of where capable range is also suitable range) has concluded that under current conditions, 58,019 acres of the analysis area are suitable for domestic sheep grazing and 49,955 are suitable for cattle grazing. This determination was based on review of the Forest level suitability analysis, field verification, review of current and historic records and analysis of GIS data layers. Field verification included using GPS collar data during the 2012-2013 field seasons for each sheep band. This data verified that 80-90% of the time, the sheep bands were within the mapped suitable acres on the allotments. Based on this information, the Responsible Official accepted that the forest-level suitability determination is sufficiently accurate for this project-level analysis. See Figures 1-7 and 1-8 and Table 3-1. Areas that were not included in the suitability analysis were areas that livestock will likely trail to get to allotments or trail to other areas of suitable grazing.

Table 3-1. Suitable Acres by Allotment and Class of Livestock.

Allotment	Total Acres	Suitable Sheep Acres	Suitable Cattle Acres
Burnt Timber	5,092	3,900	2,784
Canyon Creek	6,328	3,467	3,379
Cave Basin	22,452	5,858	5,181
Endlich Mesa	11,222	4,829	4,519
Fall Creek	11,385	1,092	743
Flint Creek	16,359	3,647	2,665
Johnson Creek	9,461	1,067	930
Leviathan	6,530	824	678
Needles Mountains	1,544	0	0
Pine River	38,843	14,512	12,312
Rock Creek	10,880	3,188	2,511
Spring Gulch	3,077	2,086	1,785
Tank Creek	10,884	6,379	5,805
Virginia Gulch	12,571	7,171	6,663
Total	**166,628**	**58,019**	**49,955**

The only range structural improvements in the analysis area are found on the Canyon Creek, Spring Gulch and Virginia Gulch Allotments. Canyon Creek Allotment has eight reservoirs, one range cabin, one corral, and about two miles of fence creating two pastures and one holding pasture. Spring Gulch Allotment has six spring developments and five water reservoirs with all water developments needing some maintenance and cleaning due to silting problems linked to Missionary Ridge Fire in 2002. Virginia Gulch has one range cabin. Besides the range cabin in Virginia Gulch, all other structural improvements are outside of wilderness boundaries.

There are several stock driveways and livestock trails in the analysis area that are currently being used to access livestock allotments (see Fig. 1-2). Most of these driveways and livestock trails are also used today as recreation trails. Access to allotments by trailing across county roads and private lands to National Forest Lands is planned to continue with authorization of term grazing permits in the analysis area. The Forest Service has no authority to authorize or not authorize use of private land trailing routes.

The Canyon Creek Allotment is currently being grazed by cattle, as a pasture in conjunction with the adjacent Bear Creek West Allotment. Cattle currently trail from private lands on the west side of Missionary Ridge up to Bear Creek West Allotment.

The Design Criteria listed in Tables 2-3 through 2-5 incorporate key management practices designed to maintain/improve conditions across the landscape. Some of the Design Criteria have been used for years in this area and have been commonly used practices throughout the western United States. Additional management practices concerning contact between Rocky Mountain bighorn sheep and domestic sheep for this project were based on the following: permittee inputs, expert knowledge from Western Association of Fish and Wildlife Agencies recommendations (*WAFWA 2012*), history of domestic sheep grazing in the San Juan Mountains, knowledge of CPW field experts, and professional judgement of the FS Interdisciplinary Team members. Based on monitoring efforts of Design Criteria for the Silverton sheep grazing analysis on the Columbine District, incorporating these practices have been found to be effective in reducing potential impacts.

In addition to this, the permittee has already instituted management practices to help improve their day to day operations, including the following:

- At least one sheep herder stays within the general area of the sheep 24 hours a day/7days a week.
- Herders typically move camps every 5-7 days and sheep usually bed in new bedgrounds every 1- 2 nights.
- Due to predator losses in the last 10-15 years, sheep permittees have started using two sheep protection/guard dogs along with 1- 2 working/herding dogs. Permittees have stated that the protection dogs scare away bears, coyotes, deer, elk and other wildlife that try to enter the herds with losses being reduced by 70-80% compared to no protection dogs.
- Current permittees and herders have never reported bighorn sheep within their allotments.
- Permittees have been submitting documentation of actual use of allotments by sheep and also by other wildlife seen as directed in AOIs.

- Stray domestic sheep due to trailing in this landscape seems to be minimal due to Design Criteria currently in place and predators. The two documented cases of strays in this landscape in the last 5 years have not gone higher up on the allotments towards bighorn sheep (BHS), but have actually trailed away from areas of concern for BHS and gone all the way back to the private land south of Ignacio, CO. The permittee has stated that the sheep want to go "home" versus exploring "new" country.

Environmental Consequences

Alternative 1: No Term Livestock Grazing

Under the No Grazing Alternative, the 13 allotments in the analysis area (162,573 acres of National Forest System lands) would be closed and no longer available for permitted term livestock grazing. This alternative would not allow the Columbine District to use these allotments to provide livestock grazing opportunities to help resolve known or potential resource conflicts on other allotments across the landscape.

Since all 13 allotments in the analysis area would be closed under this alternative, there would be no suitable range in the analysis area. For sheep, this would be a reduction of 58,019 acres, and for cattle would be a reduction of 49,955 acres, as compared to current conditions.

Since all allotments would be closed, no trailing to allotments would occur. Structural range improvements could be removed by the Forest Service.

Alternative 2: Current Management

Under the Current Management Alternative, livestock grazing would continue to be authorized as it has been in the recent past using a pre-defined number of livestock, seasons of use, and rotation systems. Changes to management in the future may trigger new NEPA analyses. All six currently stocked allotments would continue to be active and the seven vacant allotments would remain vacant. The vacant allotments would be available for permitted livestock grazing through grant and issuance of term grazing permits with stocking based on historic numbers. This alternative may require the District to go through the grant process and offer new term grazing permits, possibly to new permittees.

It is the expectation that Forest Plan standards and guidelines and Forest Plan desired conditions for rangeland resources would still be met if domestic sheep grazing is authorized, but management flexibility would be somewhat limited. Minor modifications in livestock grazing management could be made in the Annual Operating Instructions to reduce conflicts, but the ability to change grazing systems, trailing routes, season of use, and livestock numbers in response to changing conditions would be limited since monitoring and adaptive management are not a part of current management. Under current management, possible management adjustments needed in the future could require a new NEPA analysis and decision.

Permitted livestock numbers would not change. For sheep allotments, permitted numbers refer to the number of ewes, each of which may have one or more lambs. For cattle allotments, permitted numbers typically refer to the number of cow/calf pairs. Existing improvements would continue to be maintained as assigned in Term Livestock Grazing Permits and may be re-constructed once the useful life has been met and the need identified. New improvements would not be developed

unless they are authorized in a NEPA decision. Sheep allotments typically do not have structural improvements except for corrals, cabins, and loading facilities.

Since all 12 sheep allotments and the cattle allotment in the analysis area would be remain active or vacant under this alternative, there would continue to be 58,019 acres of suitable sheep range and 49,955 acres of suitable cattle range in the analysis area. Trailing to allotments would continue as it has in the recent past.

Alternative 3: Adaptive Management /Forage Reserves

Under this alternative, six allotments would remain active: Burnt Timber, Canyon Creek, Endlich Mesa, Spring Gulch, Tank Creek and Virginia Gulch. Boundary adjustments would occur on most of the active grazing allotments including, the western most parts of Tank Creek and Canyon Creek being closed to livestock grazing (total of 5,117 acres) except for trailing to the allotment. The boundary adjustments would also include 1,553 acres from Silverton Landscape EA (Needles Mountains Allotment previously closed) to be added to allotments through logical boundary shifts.

This alternative also includes four forage reserves: The northern 2/3 of Rock Creek Allotment, all of Leviathan Allotment, and most of Johnson Creek Allotment would be designated as sheep forage reserves. All three allotments would likely need to be grazed together for a band of sheep to get a complete grazing season of use. The remaining parts of Johnson Creek and Rock Creek would be closed to livestock grazing. The southern quarter of the Cave Basin Allotment would be designated as a cattle forage reserve.

In addition, four other vacant allotments would be closed to sheep grazing: Cave Basin, Fall Creek, Flint Creek, and Pine River.

This alternative continues to provide the opportunity for domestic sheep grazing on the Columbine Ranger District, while reducing the potential for contact between domestic sheep and bighorn sheep. Grazing of forage reserves may be authorized through the issuance of temporary permits. Under this alternative, term grazing permits for the forage reserves would not be granted to new applicants, or to existing permittees to increase permitted numbers or seasons. Rather, preference for grazing would be given to permittees with current term grazing permits held on federal lands where documented resource conflicts exist.

This alternative represents a considerable reduction in the number of acres available for livestock grazing as compared to current conditions. Under current conditions, there are approximately 162,573 acres in 13 allotments available for livestock grazing. Under Alternative 3, there would be approximately 45,601 acres in six allotments available for livestock grazing, with an additional 21,654 acres in sheep forage reserves and 6,220 acres in cattle forage reserves. However, once an allotment is closed to permitted livestock grazing, it is no longer considered suitable range. On the six active allotments there are 27,603 acres of suitable sheep range and 3,305 acres of suitable cattle range, with an additional 3,944 suitable sheep acres on sheep forage reserves and 4,285 suitable cattle acres on the cattle forage reserve. This is a reduction of 26,472 suitable sheep acres and 42,366 suitable cattle acres as compared to current conditions.

Under this alternative, certain allotment boundaries would be adjusted to more accurately reflect natural boundaries, to better reflect potential actual livestock usage on the ground, and to reduce potential contact between domestic sheep and bighorn sheep. Table 2-2 of this document gives a detailed description of boundary changes and the rationale for these changes. The allotments

proposed for closure under this alternative are the Fall Creek, Flint Creek, Pine River, and Cave Basin (to sheep grazing).

If the four allotments designated as forage reserves are stocked, Forest Plan standards and guidelines and Forest Plan desired conditions for rangeland resources would be met through applied management and monitoring/adaptive management feedback, and the Design Criteria contained in this EIS would be implemented. In terms of rangeland management, this alternative allows for greater management flexibility as compared to current conditions. If monitoring and evaluation finds that desired outcomes are not being achieved, then adaptive management technique(s) could be implemented to reverse undesirable trends and start moving site resource(s) of concern towards the desired conditions, in a timely manner, without requiring a new NEPA analysis. This could include adaptive management options including, but not limited to: changes to grazing systems, trailing routes, season of use, and livestock numbers in response to changing conditions.

The Design Criteria (page 56+), monitoring plan (page 70+) and adaptive management options (page 69) adopted under this alternative would allow for more timely changes in management in response to changing conditions than is available under current management. It is expected that by incorporating these Design Criteria, the risk of contact between domestic sheep and bighorn sheep should be furthered reduced. It is more likely under this alternative than under current management that management adjustments could be made in the future without conducting new NEPA analysis (assuming these adjustments are within the scope of this EIS), and in a more timely fashion.

Alternative 4: Adaptive Management / Vacant Allotments with Restocking Requirements

Under this alternative, six allotments would remain active, logical boundary shifts would occur, and all vacant allotments would not be re-stocked without meeting the specific restocking requirements. Additionally, the authorized type of livestock on some allotments, or portions of some allotments, is specified by this alternative.

This alternative continues to provide the opportunity for domestic livestock grazing on the Columbine Ranger District. This alternative would have the same environmental effects as Alternative 3 for all active sheep allotments; however by including the restocking requirements, there would be reduced opportunity for permitted domestic livestock and would also reduce flexibility of having forage reserves. Table 2-2 of this document gives a detailed description of the rationale for proposed boundary adjustments and restocking requirements.

The addition of authorizing the type of livestock on some, or portions of some allotments to include cattle grazing allows for greater flexibility to adapt to changing markets, resource and environmental concerns. Specifying which allotment or portions of allotments that are available for cattle grazing also allows for protection of areas that may be impacted by change of livestock class such as riparian areas and Colorado cut-throat trout habitat.

This alternative also represents a potential reduction in the number of acres available for livestock grazing as compared to current conditions. Under current conditions, there are approximately 162,573 acres in 13 allotments available for livestock grazing. Under Alternative 4, there would be approximately 45,600 acres for sheep and 20,870 acres for cattle in the six active allotments

available for livestock grazing. On the seven vacant allotments, once the restocking requirements have been met, there would still be 116,970 acres available for grazing.

On the six active allotments there are 27,602 acres of suitable sheep range and 13,733 acres of suitable cattle range. There are an additional 30,417 acres of suitable sheep range and 36,222 acres of suitable cattle range still available on the vacant allotments once the stocking requirements are met.

There is no change from current conditions (Alternative 2), if all restocking requirements are met on all vacant allotments; an increase of 26,472 suitable sheep acres and an increase of 42,365 suitable cattle acres as compared to Alternative 3; and an increase of 58,019 acres of suitable sheep range and 49,955 acres of suitable cattle range as compared to Alternative 1.

The allotments proposed for application of restocking requirements under this alternative are: Cave Basin, Fall Creek, Flint Creek, Johnson Creek, Leviathan, Pine River, Rock Creek, and western portions of Canyon Creek and Tank Creek.

The Design Criteria (page 56+), monitoring plan (page 70+) and adaptive management options (page 69) adopted under this alternative would allow for more timely changes in management in response to changing conditions than is available under current management. It is expected that by incorporating these Design Criteria, the risk of contact between domestic sheep and bighorn sheep should be furthered reduced. It is more likely under this alternative than under current management that management adjustments could be made in the future without conducting new NEPA analysis (assuming these adjustments are within the scope of this EIS), and in a more timely fashion.

Cumulative Impacts

The San Juan and the Rio Grande Forests in Region 2 have closed allotments or eliminated livestock grazing to resolve potential conflicts with bighorn sheep. This decreased the opportunity for public land grazing permits both locally and regionally. The potential closure of additional allotments in this analysis area will further decrease those opportunities and decrease the flexibility in overall vegetation management options as conditions change.

Across the western United States in general, there appears to be a trend towards declining opportunity for sheep grazing on FS lands. This can be attributed in part to unpredictable markets, concerns for domestic sheep impacts on bighorn sheep, and rising recreational conflicts. The fact that the vacant allotments on the Columbine Ranger District have been vacant so long indicates that the cumulative impacts of the proposed restocking requirements have already been realized and are minimal at this time.

3.2 SOIL / WATER

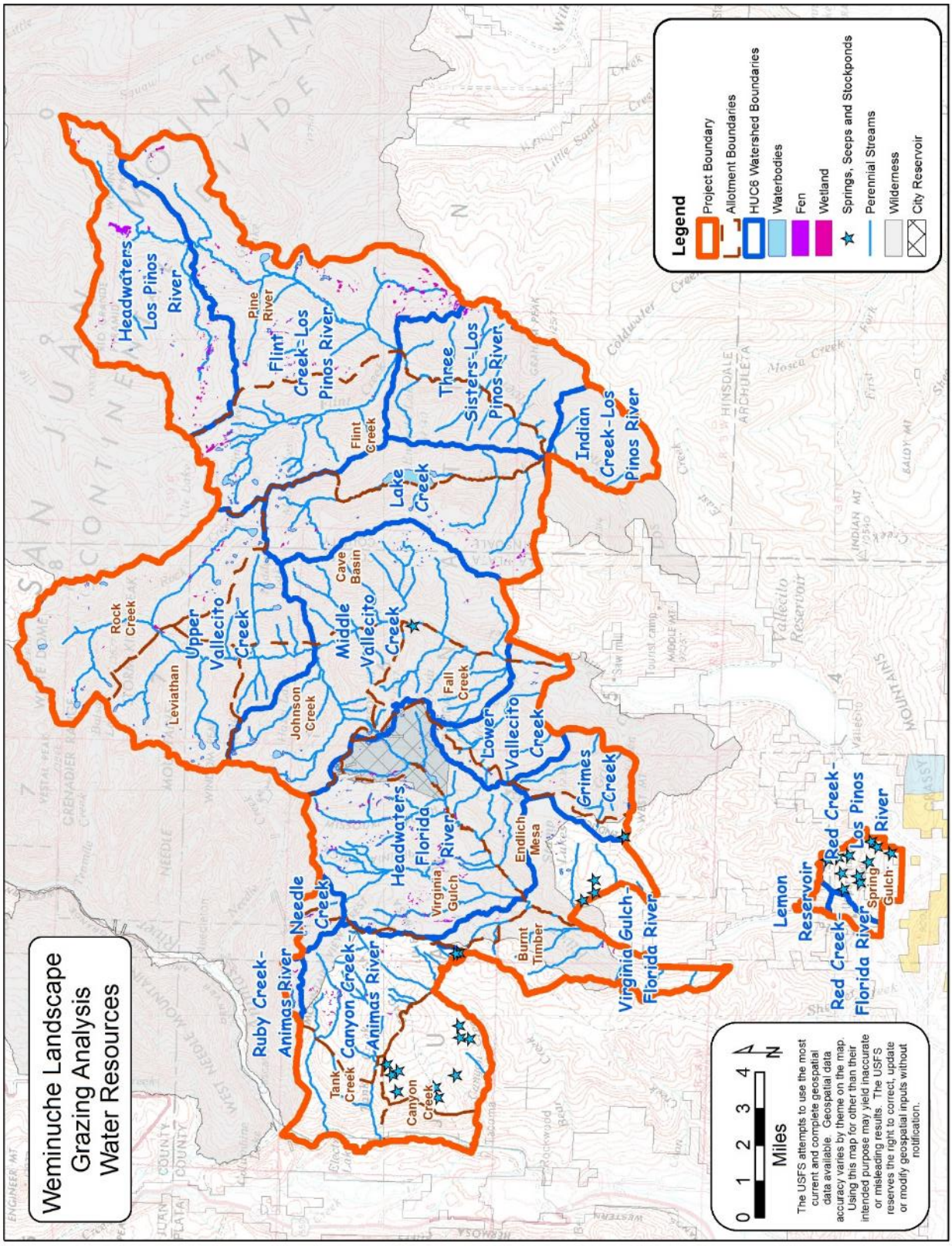
Affected Environment

The analysis area occurs within parts of 17 watersheds (Hydrologic Unit Code 6 boundaries), with about 85% of that occurring within the Weminuche Wilderness (see Figure 3-1). Average annual precipitation varies by elevation, ranging from 23 inches near Tacoma, on the Animas River, to 47 inches at the highest elevations in the Needle Mountains. Precipitation predominantly occurs in the form of snow during the winter months of November to March. Runoff from the melting snowpack accounts for most of the streamflows within the analysis area and is typically heaviest in May and June. High elevations and extreme topography drive local weather patterns in the summer, which often result in thunderstorms associated with short-term high-intensity rainfall that may cause flash flooding. Much of the analysis extent is above treeline, with rock outcroppings and talus fields dominating the landscape. Soils are primarily cold, shallow and moderate to well-drained (*USDA 1961*), although high alpine fens and wetlands are found throughout the landscape, accounting for nearly 958 acres within the analysis area.

The Missionary Ridge and Bear Creek fires burned 6,082 acres within the analysis area in 2002 and 2003 predominantly in the Middle and Lower Vallecito, Grimes, Red Creek and Virginia Gulch watersheds. A history of hardrock mining occurred throughout a portion of the analysis area in the late 1800's and early 1900's, resulting in discrete sources of heavy metal contamination and low pH effluent (*Lovekin 1997*). Gold and silver were mined in the Needle Mountains, while silver, copper and lead was found in areas near Tuckerville and Cave Basin. Currently, there are approximately 1,066 acres of existing private lands, including mining claims and in-holdings within the analysis area. In addition, the City of Durango maintains 2,961 acres primarily in the headwaters of the Florida River (Virginia Gulch and Endlich Mesa Allotments) for municipal water.

The State of Colorado has mapped the public water supplies and the watersheds that feed them. All streams in the analysis area are tributary to one or more domestic water supplies on the Animas, Pine and Florida Rivers. In addition, two sensitivity zones around streams contributing to public water supply have been mapped. Zone 1 is 100 feet either side of the stream, and Zone 2 is an additional ¼ mile from the boundary of Zone 1. Approximately 67.5% of the land in the analysis area is within sensitivity Zones 1 or 2. The State has rated the contaminant potential from dispersed sources in forested areas as moderately low. We conclude from this that most of the land in the analysis area is fairly close to streams that supply a public water supply, but that there is a moderately low potential for activities permitted within the Forest to produce contaminants.

Figure 3-1. Water Resources



Stream health and general watershed conditions found within the analysis area are dependent on factors such as geology, vegetation, climate, and the effects of land-use history, including grazing. Concentrated grazing on stream banks can lead to changes in the riparian plant community. In situations where plants are a major factor in stream stability, this can lead to the stream not being able to withstand the erosive force of flowing water and bank erosion can then occur. When banks erode, the resulting sediment impacts water quality. Extensive field time and monitoring during the summer of 2010 indicated that sheep typically do not congregate or spend much time in wetlands or riparian areas. Cattle, on the other hand, tend to spend the majority of their time in these locations. Riparian corridor health/vigor/diversity and channel form and function often suffer when AUMs or length of grazing season are not appropriate, or when movement within the allotments is not sufficient.

Proper Functioning Condition (PFC) surveys were completed by FS personnel in/near a number of riparian areas where recent sheep grazing and/or trailing was known to occur. The Lotic (*Prichard 1998*) and Lentic (*Prichard 2003*) PFC protocols address channel and floodplain functionality and stability, as well as age class and composition of riparian/wetland vegetation. This protocol also assesses such things as whether the upland watershed contributes to riparian degradation, whether hydrology has been disrupted (such as by trails or hoof action), and whether there is excessive erosion or sediment deposition. Approximately 93% (14 out of 15) of the sites inventoried were at "Proper Functioning Condition". The one site that was rated "Functional At Risk" was located near a herding camp and exhibited bank trampling and sloughing, with little to no riparian vegetation diversity present. Previous fieldwork and knowledge of the area, however, indicate that the majority of watercourses in the analysis area are in good to excellent condition. Stream banks that were observed directly after sheep had utilized the area (Coon Creek) showed minimal bank trampling and browsing on streamside plants. In general, there was little evidence that width/depth ratios were outside what is considered normal for the stream types. However, heavy historic and isolated current grazing practices, along with outfitter and recreational trail use have resulted in isolated areas of channel incision and streambank instability at stream crossings and some watering locations, resulting in on-going channel instability and sediment-loading. Additional data collected relating to vegetative consumption and trampling, as well as comparative photo points supplement and confirm the PFC methodology and results used in this analysis.

In most locations, trails from sheep movement were visible as bent-over plants, but no bare soil was exposed, no erosion was taking place, and impacts were very temporary. In areas where soils are thin and vegetation was sparse, historic sheep grazing has left a visible network of trails and terraces. Current sheep use has likely inhibited the naturally slow revegetation of these trails, but is not causing erosion on existing trails, nor a noticeable increase in the number of trails. An exception to this were isolated areas in the Endlich Mesa, Canyon Creek and Tank Creek Allotments, where trailing occurs on steep slopes with poorly developed shallow granitic soils and topographic features funnel sheep through the same areas in the landscape. Here exposed soils, trail braiding and minor pedalstalling were noted in certain places. However, there were numerous instances in most allotments where recreation trails for hikers and horses had exposed and eroded soils (e.g. Lime Mesa and Burnt Timber trails). In places where these trails were trenched, parallel trails have developed, with some delivering sediment directly to the streams. Frequently, sheep use these same trails, and distinguishing between recreation, outfitter, wildlife and sheep impacts is not possible. Impacts from trailing animals to and from grazing allotments were easier to

distinguish. However, as the vast majority of trailing routes were either on or along improved county and FS roads, watershed impacts directly related to allotment access were minimal and are not discussed when comparing alternatives.

Water Quality

The waters of Colorado have been designated according to the beneficial uses for which they are presently suitable or intended to be suitable. All streams within the analysis areas have been classified and water quality standards have been assigned (*EPA 2006*). The use classifications for streams in the analysis area are Cold Water Aquatic Life 1, Recreation 1a, Water Supply and Agriculture (*CDPHE 2011*). All stream segments in the analysis area are currently classified as fully supporting their beneficial uses and no stream segments are listed by the Water Quality Control Division of Colorado for water quality impairment (*CDPHE 2012*). The FS Watershed Condition Framework maps indicate all Hydrologic Unit Code 6 watersheds within the analysis area are functioning properly, with the exception of Canyon Creek-Animas River, Lemon Reservoir, Red Creek-Los Piños River and Red Creek-Florida River, which are designated as "Functioning at Risk". Of these, only the Canyon Creek-Animas River watershed showed either soil condition or water quality condition as limiting overall watershed health (i.e. designated "poor" condition). Upon investigation, zinc concentrations exceed total maximum daily loads in a portion of the Animas River, of which this watershed boundary includes. As this is outside of the analysis area and not directly related to sheep grazing impacts, any concerns related to Watershed Condition Framework designations are dismissed.

Literature exists that indicates that concentrated grazing in riparian areas can have direct water quality impacts such as increased turbidity, water temperatures, nitrogen, phosphorous and fecal coliform bacteria concentrations (*Gary 1983, Johnes 1996, Hubbard 2004).* Field knowledge and Environmental Protection Agency-required state testing indicate that water quality has *not* been noted as a problem or a significant issue in any of the watersheds within the analysis area, either currently or historically (*CDPHE 2012*). Water quality data of numerous alpine lakes within the analysis area dating back to the early 1980's show no signs of pH, temperature, turbidity or alkalinity being outside of expected ranges for the elevation and parent material that they were located in (*SJNF 1984*). In concurrence, an alpine lake water chemistry study across Colorado wilderness areas found that cumulative nitrate and ammonium levels in the Weminuche Wilderness were lower than all other wilderness regions tested but one (*Musselman and Slauson 2004*). Furthermore, a recent and local study in San Juan County determined that sheep grazing didn't have any consistent impact on nitrate concentrations in sub-alpine and alpine surface waters (*Raby 2005*). Since there were minimal degraded riparian areas noted indicating concentrations of sheep near water sources, we conclude that the risk is low for fecal coliform contamination from sheep manure as well. As the likelihood is low, we have not proposed any monitoring of fecal coliform and will rely on continued state testing, as well as the implementation of BMPs and monitoring of riparian areas to mitigate this potential contaminant.

Unlike the Silverton Landscape, where the potential of heavy metal contamination from grazing on mineralized soils exists, this analysis area is geologically quite different. Based on geologic knowledge of the area, mining history and field reconnaissance of the area, this landscape exhibits little opportunity for heavy metal contamination by trailing and grazing on exposed soils. Therefore, impacts related to this are not discussed when comparing alternatives.

Groundwater

The western portion of the analysis area which includes all or part of Tank Creek, Canyon Creek, Burnt Timber and Spring Creek allotments overlay edges of the Coconino-De Chelly and Dakota-Glen Canyon aquifer systems, which are subsets of the Colorado Plateau aquifer system. The vast majority of the analysis area, conversely, does not overlay a principal aquifer (*USGS 1995*). In general, the aquifers of the Colorado Plateau area are composed of permeable, moderately to well-consolidated sedimentary rocks, varying greatly in thickness, lithology and hydraulic characteristics. The USGS has identified that shallow and alluvial aquifers exist in the Pine, Florida and Animas River drainages in the vicinity of analysis area, but none directly coincide with any of the grazing allotments discussed and analyzed in this document (*USGS 1995*).

There are two existing shallow groundwater wells used for domestic drinking water in the Burnt Timber grazing allotment. They are both affiliated with FS campgrounds and are thus required to pass routine water quality testing and meet various source water protection measures. Records show that both wells have extremely low nitrate and nitrite levels, no coliform detection and neither well has ever failed any of the required testing parameters (*CDPHE 2015*).

Hydrogeologic characteristics, precipitation regime and lack of infrastructure (i.e. wells) within the analysis area would indicate that the potential for groundwater contamination from the grazing and trailing activities identified in this document is small. All new proposed watering sources would be developed in such a way to limit trampling of source water (i.e. springs, seeps) and mitigate impacts to groundwater dependent ecosystems as much as possible (*USDA 2014*).

Compliance with Clean Water Act

The Clean Water Act recognizes Best Management Practices (BMPs) as the primary mechanism to control nonpoint sources, as supported in Environmental Protection Agency guidance (*EPA 1987*), "For proposed management actions, Best Management Practices designed and implemented in accordance with State approved process will normally constitute compliance with the Clean Water Act."

FSH 2209.13-93.3 states, "Compliance with the Clean Water Act is achieved through the proper site-specific design, implementation and monitoring of Best Management Practices," and, "As long as Best Management Practices have been applied and monitoring and adjustments are ongoing, then the Forest Service is in compliance with the Clean Water Act."

The Watershed Conservation Practices Handbook (*FSH 2509.25*) also states that, "Watershed conservation practices will meet applicable Federal and State laws and regulations, including State Best Management Practices."

BMP's are referred to as Design Criteria in this document. Design Criteria and monitoring protocols for each alternative are described earlier in this document.

Environmental Consequences

Alternative 1: No Term Livestock Grazing

Under this alternative, the visible trail terracing from the high number of sheep grazed in the early 1900's would eventually revegetate, though it would be very slow, and any use from deer and elk would hinder this revegetation. System trails currently used for sheep herding would no longer be used by sheep, minimizing potential for further trail braiding, compaction and erosion, limiting sedimentation where they are hydrologically connected to stream courses. This alternative would

ultimately reduce soil movement from uplands into streams, although this is not currently a noted problem in most areas within the analysis area. Riparian and channel impacts (e.g. bank sloughing, mass wasting and sedimentation) related to sheep trailing and possible cattle grazing authorization would not occur.

Any contribution of nitrate or fecal coliform to surface waters would be discontinued under this alternative, though the existence or amount of any current impacts is considered to be low. All existing water developments would be abandoned and likely revert to natural form and function over time, protecting affiliated groundwater dependent ecosystems.

Alternative 2: Current Management

Under this alternative, impacts to watershed resources would continue as they have in the recent past. Natural revegetation of historic sheep trails would continue, but at a slower rate than in Alternative 1, as any use on these trails slows recovery times. In allotments like Endlich Mesa, Tank Creek and Canyon Creek where current trailing locations coincide with poorly developed granitic soils, continued headcutting, soil erosion and trail braiding is expected to occur, contributing to sedimentation in areas that are hydrologically connected to stream courses. Historic salting and bedding areas will continue to see the same utilization and/or degradation, as soil compaction and digging will continue to occur at the same rates.

The existence or amount of nitrate or fecal coliform contamination from sheep manure is considered to be low, though it would continue at a similar amount with the continuation of current grazing regimes. In places where bedding or salting grounds are in close proximity to water sources, fecal or mineral contamination is possible. Existing water developments and undeveloped seeps and springs would continue to see use and if not maintained properly, could affect the form and function of these groundwater resources.

Alternative 3: Adaptive Management /Forage Reserves

Under this alternative, natural revegetation of historic sheep trails would continue at a slower rate than in Alternative 1, but at a faster rate than in Alternative 2. The potential for nitrate or fecal coliform contamination would be similar to or less than Alternative 2. Closing parts of Johnson Creek and Rock Creek, the western portions of Tank Creek and Canyon Creek, the northern ¾ of the Cave Basin, most of Fall Creek and all of the Flint Creek Allotment to grazing will limit further and future soil compaction, streambank trampling and potential nutrient loading in these areas.

The addition of the 1,544 acres to the Tank Creek and Virginia Gulch Allotments under this alternative has the potential to impact watershed resources, specifically the Gem Lakes area, if grazing practices are not closely monitored. Although PFC surveys indicate systems are currently "properly functioning", grazing and recreation have caused trailing, pedalstalling and active erosion in the shallow and highly erosive granitic soils dominant here. Upland erosion is not currently affecting water quality in these alpine lakes, but the potential exists if heavy grazing continues and/or Design Criteria are not closely followed.

Under this alternative, the southern 1/3 of the Cave Basin Allotment would potentially see cattle use during drought years or times of poor forage availability. This geographic area has roughly 40 acres of fens and wetlands scattered throughout the landscape. As cattle tend to congregate and linger in riparian areas, there is high potential for increased trampling and vegetation removal, which may lead to bank sloughing, sedimentation and impaired hydrologic function of these

systems. However, given the relatively small amount of area that these sensitive systems occupy and the projected minimal use associated with a forage reserve allotment, impacts would likely not affect overall watershed health.

With the continued use of the Canyon Creek Allotment by cattle, streambank and riparian conditions would likely suffer as utilization of these areas would be higher and more intense than under use by sheep. However, the required maintenance of existing and development of new water sources and fence lines within the allotment would help with cattle distribution and reduce time spent in more sensitive riparian corridors and stream channels.

With a change of status from vacant to forage reserve/closed in all or portions of Rock Creek, Johnson Creek and Leviathan Creek Allotments identified under this alternative, the potential impacts to watershed and soil resources in effect would be reduced. Although these allotments are vacant now, a forage reserve or permanently closed designation would better protect these high-elevation allotments that contain numerous headwater streams, wetlands, fens and alpine lakes. Long-term damage is probable and of concern in these areas as any soil compaction from trailing/bedding and streambank trampling would take significant periods of time to repair.

Overall impacts to watershed resources from sheep and cattle grazing would be reduced under this alternative through the incorporation of improved and updated landscape and site-specific Design Criteria identified in this EIS. The effectiveness monitoring programs identified in this EIS would work to identify problems with established and future grazing regimes and management in this landscape, limiting short and long-term impacts to watershed resources.

Alternative 4: Adaptive Management / Vacant Allotments with Restocking Requirements

Impacts would be similar to those described in Alternative 3, but any watershed impacts related to possible future sheep grazing in the seven currently vacant allotments would not occur, as they would not be re-stocked without meeting the specific requirements and further NEPA analysis. As forage reserve for cattle grazing would not be authorized within the Cave Basin Allotment under this alternative, the likely impacts to riparian vegetation, wetlands, fens and stream courses described in Alternative 3 would not occur. Additionally, the potential impacts related to sheep grazing in the Rock Creek, Johnson Creek and Leviathan Allotments under a forage reserve scenario would not occur under this alternative.

Under this alternative, the potential for cattle grazing authorization on all of Burnt Timber and Spring Gulch Allotments, the southern 1/2 of the Tank Creek Allotment and the southern 1/3 of the Endlich Mesa Allotment would bring with it the impacts often associated with cattle grazing on public lands. These include riparian vegetation trampling and removal, soil compaction, nutrient loading, and sedimentation from stream crossings and streambank erosion. These kinds of impacts can be expected to occur in the uplands, but will likely be concentrated in riparian corridors where shade and water are plentiful. Similar to Alternative 3, however, short and long-term watershed impacts in all open allotments (for either livestock type) would be reduced through the use of landscape and site-specific Design Criteria and monitoring programs established in this EIS. These Design Criteria and monitoring protocols are meant to be comprehensive and should effectively mitigate major impacts to both ground and surface water resources found throughout the analysis area.

Cumulative Impacts

Current watershed and soil conditions are the result of many natural and anthropogenic activities occurring within the analysis area. The largest historical impacts to watershed health and water quality include hardrock mining activities, timber removal, road and trail building, and livestock grazing. Overstory removal from various timber sales have altered snowpack accumulation and melt patterns, affecting stream channel composition and morphology to a small degree. Grazing, especially by cattle, has diminished channel stability and water quality to a small degree in some drainages through riparian vegetation reduction, streambank trampling and sedimentation.

Future activities that may negatively impact watersheds and water quality include continued sheep and cattle grazing, private land development (mining claims), new road construction, increasing road and trail use, and recreational and outfitter pack stock use. The impacts to water and soil resources from domestic sheep and cattle grazing analyzed under Alternatives 3 and 4 are expected to be minimal when compared to cumulative impacts from all events and activities. Certain allotments show degradation from past grazing history, but recent stocking rates, better herd management and the incorporation of Design Criteria and monitoring efforts have all worked to minimize impacts in the recent past.

3.3 VEGETATION

Affected Environment

Rangeland Vegetation

The Weminuche Landscape Grazing Analysis Area consists of diverse vegetation types, from lower elevation sage meadows in the southern-most trailing area to closed-canopy spruce-fir forest and alpine tundra. Table 3-2 lists the acres of vegetation type within the analysis area in each allotment as it is currently configured, including both suitable and unsuitable grazing acres. The analysis area is comprised of 166,628 acres within thirteen allotments and 3,692 acres of private and National Forest System lands where sheep and/or cattle are trailed to their respective allotments. Most of the analysis area is in the spruce-fir forest type and the alpine tundra types.

The spruce-fir forest type is found between 9,000 and 12,000 feet elevation and comprises 43% of the acres considered suitable for livestock grazing within the analysis area. Grazing suitability is based on vegetation type, the availability of desirable forage for a particular class of livestock, and environmental factors like topography and accessibility. These high-density forests are dominated by Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*). This forest type is typically considered secondary range due to relatively closed-canopy cover and moderate to low forage production. In general, sheep do not like to stay in spruce-fir forest due to low forage availability and the risk of predation. Cattle also do not prefer to graze in closed-canopy forest stands. Cattle and sheep will use forested areas for trailing to sites with better forage production or water. Suitable grazing acres within the spruce-fir in this landscape are typically less dense and/or have been harvested with past timber sales.

The spruce-fir forests of the Weminuche Wilderness are currently experiencing an insect and disease epidemic. The Rio Grande National Forest and Pagosa Ranger District of the San Juan National Forest have seen high tree mortality as an effect of this outbreak. Mortality in the spruce-fir is predicted to continue on its westward trajectory into the analysis area in the near future.

Approximately 31% of the suitable grazing within the analysis area occurs in alpine habitats. The alpine zone (above 11,500 feet) comprises a great diversity of species and vegetation communities, including mosses and lichens, which constitute a major contribution to the total flora (*Johnson and Brown 1979*). The alpine zone is potentially the most sensitive to livestock grazing due to the very short annual growing season, harsh environmental conditions, length of vegetation recovery and shallow, rocky soils. Most of the alpine zone within the analysis area is composed of four general alpine vegetation types: fellfield, turf, riparian-wetland, and dwarf willow.

The alpine fellfield type occurs on harsh, wind-swept sites with shallow, rocky, well-drained soil and is dominated by short cushion plants often with a relatively low canopy cover. The dwarf willow alpine type is dominated by snow willow (*Salix nivales*) and alpine willow (*Salix petrophila*) and occurs on relatively dry protected sites on well-drained, shallow soils with moderately steep slopes and northerly aspects. The riparian-wetland type occurs primarily on low-lying sites with poorly drained soils. This type contains high plant community diversity including tall willow shrublands (*Salix planifolia* and *Salix brachycarpa*) and numerous cottongrasses and sedge species.

The turf alpine type is dominated by forbs and grasses and occurs on protected sites away from excessive wind and tends to have deeper, moist, moderately well-drained soils. Of the alpine turf

types, the alpine avens type, where alpine avens (*Geum rossii*) is the dominant or co-dominant plant species, is the most common. Of the alpine vegetation types, the alpine avens turf type is likely the most heavily used by sheep grazing due to the palatable vegetation. Sheep also readily browse on the willows and forbs in the riparian-wetland type although they do not like to stand in water or saturated soils for long periods. The fellfield and dwarf willow types see less livestock grazing because of the lack of desired forage.

Approximately 7% of the suitable grazing acres within the analysis area are within the aspen (*Populus tremuloides*) or aspen with conifer cover types. The remainder of the suitable acres within the analysis area is comprised of mountain grassland (5%), mixed conifer (6%), and mountain shrubland (3%). Ponderosa pine (*Pinus ponderosa*), rock, water and riparian areas are all within the analysis area at less than 5% of the total suitable acres.

Field monitoring and analysis were conducted at key areas during the 2009-2012 field seasons in areas considered suitable for livestock grazing. No analysis was done in areas that were considered *not* suitable for grazing (i.e. rock outcrops, steep, talus slopes, inaccessible terrain, etc.). Based on the field visits made by the Columbine Ranger District Interdisciplinary Team, monitoring data showed that most of the range is, in general, in good health and vigor. Figure 1-3 (p.8) shows monitoring points within the analysis area and Table 1-2 (p.14) provides a monitoring summary, including any need for change to reach the desired conditions as developed by the Responsible Official. Desired conditions describe the desired plant community in both the short term and the long term. The chosen desired conditions must be realistic descriptions of communities that can occupy a site under realistic management practices (*USFS 1996*).

Sheep utilize forbs more fully than any other kind of livestock using larger quantities of them and a greater number of species (*Jacobs 1999, Olsen 1999, Stoddard 1975*). Sheep are better adapted to graze steep topography so overuse of the valley bottoms can be avoided, however, when sheep are permitted to bunch together in tight herds, localized damage to plants and soil can occur leaving the ground susceptible to noxious weeds and erosion (*Stoddard 1975, Paulsen 1960*). Substantial disturbance by sheep grazing can be avoided with proper herding techniques and adequate monitoring, which are outlined in the Design Criteria (Table 2-3).

Cattle prefer graminoids to forbs but will browse on shrubs and forbs in an opportunistic situation. Cattle generally prefer open meadows where grasses, forbs and water are more plentiful and will utilize heavily timbered areas as secondary range. Cattle readily graze riparian vegetation and can, at times, stay in these areas for extended periods and cause damage to delicate riparian and fen vegetation if proper rotational grazing plans are not followed.

The following table provides total acres by vegetation types by allotment. Historic grazing actions greatly influenced existing range conditions. For a description of past and current allotment management use patterns refer to *Section 1.2 Background* and the Allotment Histories document in the project file (*Whitmer 2011*). The acres reported here are approximate and were determined using the San Juan National Forest's geographic information system (GIS) vegetation database. The acres include National Forest lands and a small amount of private land within the administrative boundary of the allotments. Vegetative species composition was compiled from GIS and past and present field monitoring notes.

Table 3-2. Vegetative Composition of Allotments Within the Analysis Area.

	Alpine	Mt. Grassland	Mt. Shrubland	Barren Rock	Riparian	Aspen	Aspen with Conifer	Cool-Moist Mixed Conifer	Warm-Dry Mixed Conifer	Ponderosa Pine	Spruce -Fir	Water	Total
Burnt Timber	0	1,233	22	0	20	682	1,842	543	58	19	672	0	5,092
Canyon Creek	0	516	48	3	31	70	1,419	1,095	283	218	2,628	16	6,328
Cave Basin	8,475	399	1,164	774	297	0	725	637	144	0	9,764	72	22,452
Endlich Mesa	4,215	317	97	571	98	0	50	94	0	0	5,704	76	11,222
Fall Creek	2,390	978	609	547	72	80	21	1,581	398	352	4,352	6	11,385
Flint Creek	4,951	331	689	421	104	305	1,282	1,139	74	242	6,448	372	16,359
Johnson Creek	4,314	613	341	127	170	0	489	80	0	0	3,275	52	9,461
Leviathan	3,227	403	136	444	76	156	727	10	0	54	1,242	55	6,530
Needles Mt.s	1,125	0	0	16	34	0	0	0	0	0	342	27	1,544
Pine River	9,212	846	1,577	164	1,701	113	2,032	1,487	402	0	21,199	110	38,843
Rock Creek	5,647	249	102	898	183	0	121	0	78	0	3,501	101	10,880
Spring Gulch	0	1,046	130	0	0	1,082	11	62	359	382	0	5	3,077
Tank Creek	2,579	297	163	43	96	0	403	839	379	320	5,745	22	10,884
Virginia Gulch	5,257	554	37	157	214	0	39	0	0	0	6,293	20	12,571
Total	51,393	7,783	5,115	4,164	3,097	2,488	9,162	7,567	2,175	1,587	71,164	933	166,628

Understory vegetation across the analysis area is based on a number of environmental and management factors. Common grasses found in meadows in the lower to mid-elevation range (6,500 to 9,000 feet) are Kentucky bluegrass (*Poa pratensis*), Thurber fescue (*Festuca thurberi*), elk sedge (*Carex geyeri*), common timothy (*Phleum pretense*), brome grasses (*Bromus* spp.) and wheatgrasses (*Agropyron* spp.). Common forbs and shrubs found in this range are dandelion (*Taraxacum officinale*), yarrow *(Achillea millefolium*), heartleaf arnica (*Arnica cordifolia*), American vetch (*Vicia americana*), strawberry (*Fragaria virginiana*), Gambel oak (*Quercus gambelii*), and snowberry (*Symphoricarpos albus*).

At higher elevations (9,001+ feet), the understory is dominated by tufted hairgrass (*Deschampsia caespitosa*), elk sedge, dandelion, bistort (*Bistorta bistortoides*), buttercup (*Ranunculus coloradensis*), carrot (*Daucus* spp.), strawberry and geranium (*Geranium caespitosum*). Common shrubs are native willows (*Salix* spp.), shrubby cinquefoil (*Potentilla fruiticosa*), raspberry (*Rubus* spp.), common juniper (*Juniperus communis*) and snowberry. Above 11,500 feet, alpine vegetation is found as described earlier in this section.

There are 958 acres of GIS-classified wetlands and/or sedge meadows in the analysis area mostly within the Pine River, Virginia Gulch and Tank Creek Allotments. Of the 958 acres, there are 283 acres of classified fens. Fens are a specific type of wetland that accumulate organic matter or "peat" and rely on groundwater as its water source. In addition to storing and cycling carbon, fens are areas of high regional biodiversity and refugia for rare species (*Cooper 2006*).

Cattle and Sheep Trailing Areas

In addition to the thirteen allotments previously listed, 2,022 acres of Forest Service lands are or may potentially be utilized by sheep and/or cattle for trailing into permitted allotments. The area associated with active and proposed cattle or sheep trailing dissects a diversity of vegetation types from small areas of sagebrush, piñon/juniper and desert grassland (102 acres) across the elevation gradient into the ponderosa pine and warm/dry mixed conifer (239 acres) into areas of mountain grassland and aspen (904 acres) and into the higher elevation spruce/fir forest (616 acres).

Noxious Weeds

Some of the analysis area has been inventoried for noxious weeds. Noxious weeds are reported by allotment and by trailing ingress/egress routes into the respective allotments.

Burnt Timber

Houndstongue (*Cynoglossum official)* is one of the most common noxious weeds seen along popular sheep trailing and recreation routes in this allotment. Occurrences of Canada thistle, (*Cirsium arvense*), musk thistle (*Carduus nutans)* and houndstongue have been reported along the southeastern boundary of the allotment, in the Transfer Park campground, along the Burnt Timber Trail, and in association with two sheep bedgrounds near the Lime Mesa Trail.

Canyon Creek

Yellow Toadflax *(Linaria vulgaris)* and musk thistle are found along the Missionary Ridge Road within the allotment with a trend of "increasing." Canada thistle is also common along this busy, forest corridor.

Cave Basin

While no infestations of noxious weeds have been recorded within the Cave Basin Allotment, Canada thistle, musk thistle and houndstongue are common along the Pine River Trail, the trail to Emerald Lake and just outside the southern allotment boundary in the Vallecito Allotment.

Endlich Mesa

Several acres of Canada thistle exist on the southern portion of the allotment associated with old roads and landings from past logging operations.

Fall Creek

Canada and musk thistle have been reported along the non-system trail along the southern side of the creek in the Fall Creek Allotment.

Spring Gulch

Occurrences of yellow toadflax, musk thistle, Canada thistle and houndstongue have been reported throughout the primary range in the Spring Gulch Allotment.

Tank Creek

Musk and Canada thistle have been reported in localized areas associated with livestock/recreation trails and old logging roads within the Tank Creek Allotment. Canada thistle is also common along the sheep trailing routes used to access the allotment by permittees.

Cattle and Sheep Trailing Routes

The most common noxious weeds associated and recorded within the 990 acre trailing area are Canada and musk thistle. These species commonly occur south and north of the Spring Gulch Allotment and within the Sauls Creek Allotment where the sheep trail through from private lands. Musk thistle and houndstongue occur south of the Burnt Timber Allotment and in the Transfer Park Campground where the sheep trail through and bed-down on their way to the Burnt Timber, Virginia Gulch, Endlich Mesa and Tank Creek Allotments. Musk and Canada thistle are also common along the Pine River Trail which is the primary passage route to the Rock Creek, Leviathan and Pine River Allotments.

Threatened or Endangered Flora Species

There are no federally listed threatened or endangered plant species known or suspected to occur within the Weminuche Landscape Grazing analysis area.

Region 2 Sensitive Flora Species

There are known occurrences of five Region 2 sensitive species within the analysis area: whitebristle cottongrass (*Eriophorum altaicum* var. *neogaeum)* in the Tank Creek, Virginia Gulch and Cave Basin Allotments; Chamisso's cottongrass (*Eriophorum chamissonis)* in Endlich Mesa Allotment; Colorado tansyaster (*Machaeranthera coloradoensis)* within the Tank Creek and Pine River Allotments; West silver bladderpod (*Physaria scrotiformis)* within the Virginia Gulch Allotment; and sageleaf willow (*Salix candida)* in the Johnson Creek Allotment.

The following twelve species have never been found in the analysis area nor have there been specific surveys conducted for them; however, habitat for these species exists within the analysis area. These species are: stonecrop gilia (*Aliciella sedifolia),* lesser panicled sedge (*Carex diandra),* yellow lady's slipper *(Cypripedium parviflorum),* Smith's draba *(Draba smithii),* English sundew *(Drosera anglica),* slender cottongrass *(Eriophorum gracile),* Kotzebue's grass-of-Parnassus (*Parnassia kotzebuei*), Arizona willow *(Salix arizonica),* autumn willow (*Salix serrisima*), sphagnum moss *(Sphagnum angustifolium),* Baltic bog moss *(Sphagnum balticum)* and lesser bladderwort *(Utricularia minor).*

A more detailed description and analysis of these species can be found in the Biological Evaluation for Plants in this project's records (*Jones 2015*).

Environmental Consequences

Alternative 1: No Term Livestock Grazing

Under this alternative, term grazing permits would be cancelled after permittees had been given one year written notice of cancellation. Compared to Alternatives 2, 3 and 4, this alternative offers the greatest potential of meeting desired condition objectives for vegetation in the shortest timeframe.

The short-term effect of removal of domestic livestock grazing would be a localized increase in litter and vegetative cover. Soil disturbance associated with livestock trailing and grazing would decrease and livestock-use trails would re-vegetate over time. Removal of grazing would not necessarily bring about immediate changes in plant composition in upland areas dominated by non-native species and early-seral forbs. In these areas, changes in species composition and ecological succession may only be seen over a long period of time (*Heitschmidt 1991*). In other

areas that show a mixture of natives and non-natives, it is possible that removal of livestock grazing could favor the native species. Species such as Arizona fescue have been shown to increase their stands under no grazing or light grazing. However, it is important to note that the rate and direction of plant succession following the removal of grazing is dependent on the degree to which soil properties and hydrology within the area have been altered, in addition to the extent which non-natives and invasive species have occupied the site. Other herbivores would also still be present in the analysis area effecting composition and ecological succession. Effects of grazing by recreational stock would continue including the spread and potential increase in non-native vegetation and noxious weeds. Natural disturbances including fire, disease, insects and weather events (such as drought) would continue to influence ecological conditions in the analysis area.

This alternative would result in improved ecological conditions overall since effects of trailing, bedding, salting and other activities associated with grazing by permitted livestock would be eliminated. Desired conditions across the analysis area would remain stable and areas deemed at risk due to domestic livestock grazing would improve.

Noxious weeds would continue to be present across the analysis area. Though permitted livestock would no longer contribute to the spread of invasive species, recreational stock, wildlife, other management activities (such as logging or prescribed burning) and recreation activities (roads and trails) would continue to spread noxious weeds throughout the analysis area. Noxious weed management would continue.

Alternative 2: Current Management

Under this alternative, term livestock grazing management would not change and effects from livestock grazing would be the same as they are currently. The existing conditions reported for active allotments would remain the same. The vacant allotments would remain vacant and available for new permits. If permits were issued for the vacant allotments, effects of livestock grazing activities, specifically at trailing, bedding and salting areas would be evident at sites that have currently healed from past grazing. These effects include a decrease in the abundance and vigor of plant species due to sheep grazing and trampling, which often occurs at bedgrounds and salt grounds, and would decrease the amount of ground cover, increase the amount of exposed soil and increase the chance for erosion and runoff (*Lull 1959, Orr 1975, Dunford 1954, Smith 1967, Forsling 1931*). The alpine turf type, which is the most used alpine type by sheep, may experience greater impacts than other vegetation types because of the fragility of the vegetation there and the time in which it takes this zone to recover. Grazing would continue in riparian areas, wetlands and fens. Though sheep do not like to stand and/or graze long in saturated soils, continued trailing through wet areas could cause localized effects on vegetation there.

Under this alternative, the trends described in Table 1-2 for existing conditions at key areas would likely continue on their current trajectories. Non-native species and noxious weeds would likely persist in areas where they currently exist though this condition is influenced by many factors, not just livestock grazing.

Under Alternative 2, no cattle forage reserve would be authorized in the Cave Basin Allotment; therefore there would be no affects from cattle grazing in that allotment.

Noxious weeds would continue to be present across the analysis area and livestock would continue to contribute to their distribution. Under all alternatives, in the areas within the analysis area where noxious weeds exist, per the San Juan National Forest Noxious Weed EA and decision (*SJNF*

2012), the Forest Service would continue to use an integrated approach including chemical and biological treatments to address the noxious weeds problem within the allotments.

Alternative 3: Adaptive Management /Forage Reserves

Under Alternative 3, effects of term livestock grazing as described in Alternative 2 would continue on six allotments: Burnt Timber, Canyon Creek, Endlich Mesa, Spring Gulch, Tank Creek and Virginia Gulch. However, adaptive management strategies would be incorporated, which would allow managers greater flexibility in implementing practices to help achieve desired conditions.

This alternative proposes a boundary adjustment which would close 5,116 acres of the Tank Creek and Canyon Creek Allotments. The acreage exists within rangelands considered unsuitable for grazing and have not seen the effects of active grazing due to inaccessibility, poor forage and/or rocky, steep terrain. The effects on these closed 5,116 acres would be the same as those listed in Alternative 1. The boundary adjustment would also add 1,544 acres of the previously-closed Needles Mountains Allotment (*SJNF 2009*) into the Tank Creek and Virginia Gulch. This area which is not currently experiencing any effects from livestock grazing would experience potential change due to sheep grazing, such as decreased vegetative cover and vigor and an increase in soil impacts and vectors to spread noxious weeds. However, with the employment of adaptive management strategies, these effects would be localized and short-lived with monitoring and adjustments in management

This alternative proposes to keep the southern portion of the Cave Basin Allotment open as a cattle forage reserve. If authorized for temporary use, the impacts currently seen from past cattle activity would continue. Cows tend to wallow and graze in riparian areas. In the Cave Basin Allotment, riparian vegetation and fens are common and would potentially be adversely impacted through decreasing vegetative cover and vigor and creating interruptions in hydrology due to cattle trailing, trampling and grazing. Specific Design Criteria and adaptive management options would minimize these concerns.

Under this alternative, the Canyon Creek Allotment would be considered for improvements such as stock water developments and construction of new pasture boundary fences. Through Design Criteria, use of fences to create an effective rotational grazing system and the use of adaptive management, the key areas here would maintain a healthy rating. Better dispersal of livestock through range improvements and/or a range rider would allow for desired conditions to be sustained or obtained.

Portions of Rock Creek, Johnson Creek and Leviathan Allotments would become sheep grazing forage reserves under this alternative. These areas are currently vacant and open to permitted livestock grazing. Portions of these areas are rich in wetland and riparian vegetation that can be disturbed by livestock during grazing activities such as trailing and trampling during watering. Under this alternative, grazing could occur temporarily (three years in ten years) as described earlier in this document. Because the allotments would be rested seven out of ten years the effects of livestock grazing would be minimal. Additionally, with the employment of adaptive management strategies, these effects would be localized and short-lived with monitoring and adjustments in management.

Noxious weeds would continue to be present across the analysis area and livestock would continue to contribute to their distribution. Under all alternatives, in the areas within the analysis area where noxious weeds exist, per the San Juan National Forest Noxious Weed EA and decision (*SJNF*

2012), the Forest Service would continue to use an integrated approach including chemical and biological treatments to address the noxious weeds problem within the allotments. Though permitted livestock would no longer contribute to the spread of invasive species in the closed allotments, recreational stock, wildlife, other management activities (such as logging or prescribed burning) and recreation activities (roads and trails) would continue to spread noxious weeds throughout the analysis area. Noxious weeds may continue to be spread and introduced in the allotments designated as forage reserves, as they are intended to be utilized by domestic livestock on a temporary basis when need exists.

Alternative 4: Adaptive Management / Vacant Allotments with Restocking Requirements

Under this alternative, all the actions proposed for the six active grazing allotments (Burnt Timber, Canyon Creek, Endlich Mesa, Spring Gulch, Tank Creek and Virginia Gulch) including boundary adjustments, trailing, and employing Design Criteria and adaptive management options would be the same as Alternative 3. However, this alternative proposes to provide the option to permit cattle on the Burnt Timber, Canyon Creek, Spring Gulch and portions of the Endlich Mesa and Tank Creek allotments.

Unlike sheep, cattle tend to graze in riparian areas. Riparian vegetation would potentially be adversely impacted through decreasing vegetative cover and vigor and creating interruptions in hydrology due to cattle trailing, trampling and grazing. However, specific Design Criteria, including the implementation of range improvements and/or a range rider, and adaptive management options would minimize these concerns.

Alternative 4 proposes that all currently vacant allotments would not be re-stocked without meeting the specific restocking requirements and conducting more NEPA analysis. Additionally, there would be no forage reserves authorized. The effects to these allotments would essentially be the same as described in Alternative 1.

Noxious weeds would continue to be present across the analysis area and livestock would continue to contribute to their distribution in the open allotments. Under all alternatives, in the areas within the analysis area where noxious weeds exist, per the San Juan National Forest Noxious Weed EA and decision (*SJNF 2012*), the Forest Service would continue to use an integrated approach including chemical and biological treatments to address the noxious weeds problem within the allotments. Though permitted livestock would no longer contribute to the spread of invasive species in the vacant allotments with restocking restrictions, recreational stock, wildlife, other management activities (such as logging or prescribed burning) and recreation activities (roads and trails) would continue to spread noxious weeds throughout the analysis area.

Threatened or Endangered Flora Species Consequences

A determination of **"no effect"** was reached for threatened and endangered plant species since there are no federally listed threatened or endangered plant species known or suspected to occur within the Weminuche Landscape Grazing Analysis Area.

Region 2 Sensitive Flora Species Consequences

Under Alternative 1, a determination of **"no impact"** to any known populations of sensitive species or potential habitat of sensitive species due to livestock grazing or activities associated

with livestock grazing was made since no livestock term grazing permits would be issued on any of the allotments within this landscape.

Under Alternative 4, a determination of **"no impact"** due to livestock grazing or activities associated with livestock grazing to the *known* populations of sageleaf willow in the Johnson Creek Allotment or to the Colorado tansyaster in the Pine River Allotment or to the whitebristle cottongrass within the Cave Basin Allotment was reached since these allotments would not be re-stocked without meeting the specific requirements under this alternative.

Whitebristle conttongrass, Chamisso's cottongrass and sageleaf willow grow in riparian areas, bogs and fens with saturated soils. Sheep do not typically like to wallow, stand or trail through wet areas though they would graze upon the fringes of these areas where the ground is drier where these species do not persist. Allowing cattle to graze in the southern portion of the Cave Basin Allotment (as proposed in Alternative 3) would have more of an impact on riparian vegetation since cattle would potentially wallow, stand, trail and graze through saturated soils. However, if a forage reserve were to be permitted, Design Criteria would be employed that would mitigate livestock use in these areas (Table 2-5, Criteria 3.5). Therefore, a finding of **"may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend to federal listing or a loss of species viability range wide"** was made for whitebristle cottongrass, Chamisso's cottongrass and sageleaf willow for Alternatives 2, 3 and 4.

The Colorado tansyaster and west silver bladderpod are known to occur in the fellfield alpine type, which has low canopy cover, abundant surface rock and patches of bare soil. Sheep foraging in this type is minor as the dominant plants that occur there are not preferred forage species (*Redders 2009*). Though it is not expect to occur, trampling and uprooting of individual plants could occur to these species during associated range management activities such as trailing. Therefore, a finding of **"may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend to federal listing or a loss of species viability range wide"** was made for Colorado tansyaster and West silver bladderpod for Alternatives 2, 3 and 4.

Potential habitat exists within the project area for the Kotzebue's grass-of-Parnassus, stonecrop gilia, lesser panicled sedge, yellow lady's slipper, Smith's draba, English sundew, slender cottongrass, Arizona willow, autumn willow, sphagnum moss, Baltic bog moss, and lesser bladderwort. There could be potential direct effects due to livestock grazing including grazing, trampling or uprooting of individual plants by livestock grazing in the area, and trampling or uprooting of plants during range management activities. However, adaptive management strategies, specific Design Criteria and monitoring that would be used under Alternatives 2, 3 and 4 would mitigate continued overuse of these habitats. Therefore, a **"may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range wide"** determination was made for Alternatives 2, 3 and 4 for the above listed species.

A **"no impact"** determination was made for the following species, which have no habitat within the project area: Missouri milkvetch *(Astragalus missouriensis var. humistratus*), Aztec milkvetch (*Astragalus proximus*), stream orchid (*Epipactis gigantea*), Lone Mesa snakeweed (*Gutierrezia elegans*), frosty bladderpod (*Lesquerella pruinosa*), cushion bladderpod (*Physaria pulvinata*), and large-flower triteleia (*Triteleia grandiflora*).

Cumulative Impacts

Current vegetative conditions within the analysis area have resulted from many management activities over time including livestock grazing, timber harvest, recreational uses, and fire suppression.

Livestock grazing and many other activities have contributed to noxious weed introduction and persistence on the landscape. Activities such as road building, off road vehicle use, dispersed and developed recreation, recreational stock use, mining activities, and drought contribute to invasive species establishment and spread. At current levels of noxious weed treatment, populations of weeds will increase or, at best, remain stable.

Approximately 11,202 acres of timber harvest has occurred in spruce-fir, Douglas fir (*Psuedotsuga menziesii*), white fir (*Abies concolor*) and/or aspen within the analysis area from 1957 to 2003. The resulting vegetative conditions from these harvests are mixed. Some previously heavily stocked clear-cut areas are more open mountain meadows and shrublands with sparse overstory regeneration. Other post-harvest areas have succeeded to mature forested stands.

3.4 RECREATION /WILDERNESS

Affected Environment

The project area is divided into 13 grazing allotments, six active and seven vacant, with 85% of the project area within the Weminuche Wilderness. The Wilderness Act of 1964 (*P.L. 88-577*) allows for Congress to designate "wilderness areas" throughout the nation and on public lands managed by the US Forest Service, US Fish and Wildlife Service, Bureau of Land Management and National Park Service. The Act prohibits the use of motorized or mechanized travel and motorized equipment within designated wilderness areas. The Weminuche Wilderness was designated by Congress in 1975 with additions in 1980 and 1993. It is the largest designated wilderness in Colorado, has three 14,000 foot peaks with numerous peaks at or above 13,000 feet. Within the Weminuche, there is 80 miles of the Continental Divide National Scenic Trail which runs along the backbone of the Rocky Mountains. Of these 80 miles, 20 miles are within this project boundary. Primitive forms of travel are allowed, foot and horse, and the major types of recreational activities include hiking, backpacking, horseback riding, horse packing, peak climbing, fishing, hunting, viewing wildflowers, scenery and wildlife, seeking solitude and some winter activities that include snowshoeing and back country skiing. There are 144 miles of system trail and approximately 20 miles of user created trails in the project area.

Within the project area, there are also approximately 25,000 of National Forest lands that are non-wilderness where recreationist drive, hike or horseback to enjoy fishing, hunting, camping, trailhead access and viewing the scenery. Only around 50% of these 25,000 acres are accessible because of steep rugged terrain. The area of these more motor-dependent activities are in the upper Missionary Ridge area accessible by Missionary Ridge Road (#682) and the East Florida Road (#597) leading to Endlich Mesa. There are two campgrounds within this analysis area: Florida and Transfer Park Campgrounds, both at the bottom of East Florida Road and north of Lemon Reservoir. The sheep enter the active allotments in the wilderness by trailing by these two campgrounds, the Burnt Timber Trail, and East Florida Road. The sheep are also herded back out using the same trails, roads and campground vicinities.

The following discussion of affected environment is organized by allotment with a discussion of the recreation uses and management direction within each allotment.

Burnt Timber Allotment

This currently active allotment consists of wilderness and non-wilderness acres. There are approximately 2,408 wilderness acres and 2,683 non-wilderness acres in this allotment. There is one system trail, Burnt Timber (#667), which starts at the trailhead adjacent to Transfer Park Campground. This trail was originally created by use as a stock driveway to access grazing areas to the north. Currently, it is within the Weminuche Wilderness and is a main access into the Virginia Gulch, Silver Mesa, and Missouri Gulch country, and enables wilderness users to do loop trips using the Endlich Mesa Trail to City Reservoir. The public horse and hiker use of the Burnt Timber Trail is moderate and primarily acts as a corridor to other areas of the wilderness. This allotment acts as a pass-through allotment for several bands of sheep headed to the Virginia Gulch, Canyon Creek and Tank Creek Allotments, with trailing, grazing and bedding occurring on the way up in the spring, and on the way down in the fall. Trail impacts occur from sheep utilizing the trail in the bottom 2-3 miles and sheep crossing back and forth across the trail into the Virginia Gulch Allotment. The Burnt Timber Trail is in poor condition due to multiple braids.

There are 11 permitted outfitters in the wilderness that travel through the Burnt Timber Allotment into the Lime Mesa, City Reservoir, Silver Mesa and East Silver Mesa country. The activities they provide are horse packing and back packing trips for the activities of hunting, fishing, viewing scenery, environmental education and enjoying solitude. Recreation activities in this area range from developed camping with full facilities to horseback and back packing trips, camping, fishing, rock climbing, hunting, day hiking, viewing flowers, scenery and wildlife.

The remaining acres of this allotment include two developed campgrounds (Florida and Transfer Park), a large group campground (Florida Group Area) and the Burnt Timber trailhead facility. There are sheep and recreationists interfacing in the developed sites at the campgrounds, at the Burnt Timber trailhead and on the Burnt Timber Trail. Timing of trailing to avoid the busiest recreation weekends reduces the number of complaints from recreation users at the campgrounds, but still conflicts with recreationists and archery hunters. For most non-wilderness users, seeing the sheep pass through or to see the herder's sheep camper parked near the trailhead or is a unique experience.

Canyon Creek Allotment

The Canyon Creek Allotment sits north of Canyon Creek, south of Tank Creek and west to the Durango Silverton Narrow Gauge Railroad. None of the 6,328 acres in this allotment are within the Weminuche Wilderness. The Missionary Ridge Road (#682) and the Lime Mesa Road (#081) are the main public access points to this country. Henderson Lake is enjoyed by the recreating public for camping, fishing, hunting and relaxing. There is also a dispersed camping area along the north side of Canyon Creek and below the main Missionary Ridge Road.

Hunting, fishing, firewood gathering, dispersed camping, driving for pleasure and snowmobiling in the winter are the main uses within the Canyon Creek Allotment. A local snowmobile club has a Special Use Permit to groom the Missionary Ridge Road and one mile of the Lime Mesa Road. There are no trails, trailheads or developed campgrounds in this allotment, hence no major recreation/sheep conflicts, except when sheep are bedded in the areas where recreational users camp and hunt. Many of the users to this area are not offended by sheep but are intrigued by seeing them.

Cave Basin Allotment

Cave Basin Allotment has approximately 22,450 acres that are entirely within the Weminuche Wilderness, except for about three acres. There is one Forest Service system trail that provides access into this area, Cave Basin Trail (#530), which is off the Middle Mountain Road (#724) north of Vallecito Reservoir. Most recreational use is during the summer and fall with hiking, backpacking, horseback riding, horse packing and hunting as the main activities. The use in this area is moderate, with Dollar Lake as the main destination. The trail does not connect to any other system trails for loop trips, consequently, users encounter trail traffic in both directions. There are numerous high alpine lakes in the northern part of this allotment (Irving, Lost, and Hidden) with no system trails or user-created trails into them. These lake basins provide for a pristine setting where the possibility of encountering other users is very low to non-existent.

There are currently six permits for commercial outfitting and guiding within the Cave Basin area. The activities permitted are hiking, horseback riding, backpacking and horse packing trips, hunting and environmental education.

Endlich Mesa Allotment

This allotment is composed of 8,174 wilderness acres, and 3,049 non-wilderness acres, although most of the suitable grazing is in the high alpine ecosystem within the Weminuche Wilderness. In this allotment there is one system trail, Endlich Mesa Trail (#534), which starts from the end of East Florida Road (#597) and travels to City Reservoir. There are sheep trails adjacent to the Endlich Mesa Trail on both the east and west sides, thus creating multiple braided trails that often confuse hikers. Wilderness users to this area encounter not only the sheep in Endlich Mesa Allotment but also the sheep that are grazed in the Virginia Gulch and Burnt Timber Allotments, as most users travel through all three allotments when on a wilderness trip. Wilderness users have issue with sheep in this area due to encountering more than one band, the smell of the animals and their feces, noise, the impacts to the wildflowers and the loss of vegetation from grazing.

The upper three miles of the East Florida Road and the Stump Lake Road and trail are located in the non-wilderness acres. These roads rough and minimally maintained, and are best traveled by high clearance vehicles. The ongoing recreation activities include some dispersed camping, hunting, off highway vehicle use, snowmobiling and hiking. A snowmobile club grooms the East Florida Road to the trailhead for motorized winter recreation under a Special Use Permit. This non-wilderness portion of the Endlich Mesa Allotment gets a moderate amount of use in the summer, fall and winter. Because travel on the East Florida Road is rough and slow, the use in the wilderness is low to moderate during the summer and early hunting seasons.

There are 11 permits issued to outfitters that provide multi-day backpacking and horse packing trips. The activities include hunting, fishing, and peak climbing, environmental education and solitude experiences.

Fall Creek Allotment

The Fall Creek Allotment has approximately 11,381 acres in the wilderness. It is bordered on the east and west by National Forest system trails leading into the Weminuche Wilderness. The Vallecito Trail (# 529) is on the eastern boundary of the allotment and is a main access to hundreds of miles of trails, lakes and peaks within the Weminuche Wilderness. It is one of the most heavily used trails both by day hikers from the Vallecito Campground and by horse packers and backpackers heading in for multi-day trips.

The western edge of this allotment is in the alpine ecosystem and has the Endlich Mesa Trail (#534) as its western boundary. This trail sees moderate use, as the access is limited by a rough road recommended for high clearance vehicles, East Florida Road (#597).

The acres that are currently being grazed by sheep are in the northwestern part of the allotment and show signs of trailing where there is loss of vegetation and soil. The remainder of this allotment is currently not used due to the steep, heavily forested and rugged terrain, and therefore there are no conflicts with recreationists in the remainder of the allotment.

Within this allotment there is some use by hunters during the archery and first and second rifle seasons. There are eight permits for outfitters in this area to provide some horse packing and backpacking activities mostly in the East Silver Mesa country and traveling along the Vallecito Trail.

There has been no grazing in this allotment since 1968 so there are currently no conflicts between wilderness users and sheep grazing.

Flint Creek Allotment

All of the 16,359 acres of the vacant Flint Creek Allotment are within the Weminuche Wilderness and include big and little Emerald lakes, Flint Lake, and Moon Lake. These are very popular destinations for wilderness users and the Emerald lakes and Flint Lake have specific regulations around the lake basins to protect the lakeshore and riparian ecosystems from camping and livestock impacts. These restrictions have been in place since 1977. National Forest system trails provide access for foot and horse users: Flint Creek Trail (#527), Lake Creek Trail (#528) and the Pine River Trail (#523). These trails receive heavy use during the summer and into archery and first rifle season. There is a user-made trail from Moon Lake to Rock Lake which is very popular and only passable for hikers.

There are eight permits for outfitters provide commercial services to the public for backpacking, horse packing, hunting, fishing, and environmental education trips. During summer and fall (June - October), the recreational use within this allotment is high. Winter sees little use because of the steep terrain and distance from a plowed road for winter access, although there will be an occasional skier or person snowshoeing winter camping.

There has been no grazing in this allotment since 1972 so there are currently no conflicts between wilderness users and sheep grazing.

Johnson Creek Allotment

The Johnson Creek Allotment has approximately 9,461 acres that are entirely within the Weminuche Wilderness. Johnson Creek Trail (#504) is the main system trail that provides access into this allotment and into Chicago Basin as it climbs over Columbine Pass. Also intersecting the Johnson Creek Trail at 12,000 feet is the Endlich Mesa Trail (#534) which travels to Trimble Pass and provides access to City Reservoir in the Endlich Mesa Allotment. In addition to these two trails, there is approximately four miles of the Vallecito Trail (#529) in the lower portion of the allotment.

Approximately 13 miles of a very popular and busy 35 mile backpacking loop falls within this allotment. The loop is popular because users can ride the Durango-Silverton Narrow Gauge Train to one of two train stops on the Animas River (Needleton or Elk Park) and return to the other stop. Vallecito Creek Trail and Johnson Creek Trail make that 13 mile portion of the “loop.”

In the upper basins of Johnson Creek there are two alpine lakes (Columbine and Hazel) that draw many visitors, both those making the loop, and many others from Chicago Basin day hiking up and over Columbine Pass. Needle Creek (Chicago Basin) is the busiest drainage in the entire Weminuche Wilderness with 50 -100 visitors daily during July and August. There are nine permitted outfitters in this allotment providing backpacking, horse packing, peak climbing, and environmental education services and some hunting.

There has been no grazing in this allotment since 1968 so there are currently no conflicts between wilderness users and sheep grazing.

Leviathan Allotment

Leviathan Allotment has approximately 6,530 acres that are entirely within the Weminuche Wilderness. There is a user created trail from the Vallecito Trail, going up Leviathan Creek, that provides access to Leviathan Lake and the surrounding peaks. This user-created trail is not maintained and once it climbs up the bottom two miles of the drainage, it is not passable by stock.

In addition to Leviathan drainage this allotment includes the Sunlight Creek drainage where there is a user-created trail to the Sunlight lakes from the main Vallecito Creek Trail. These two pristine basins are also accessible to backpackers from several directions by high elevation travel. They receive wilderness use by those determined to seek a more solitude experience, climb peaks and enjoy the alpine tundra ecosystem. There are seven permitted outfitters operating within this allotment providing backpacking and environmental education services. This area of the wilderness is rugged and steep and sees light use.

There has been no grazing in this allotment since 1970 so there are currently no conflicts between wilderness users and sheep grazing.

Pine River Allotment

The Pine River Allotment consists of approximately 38,843 acres, all of which are in the Weminuche Wilderness. The Pine River Trail (#523) is the main travel corridor through this allotment and provides access for the many side drainages; Rincon La Osa Trail (#525), Rincon La Vaca Trail (#813), Snowslide Trail (#653), North Fork Trail (#813), Sierra Vandera Trail (#524) and Granite Lake Trail (#540). The area features major attractions and destinations some of which are Pyramid Peak, the Window, the Continental Divide National Scenic Trail (CDNST #813), Granite and Divide Lakes, and Willow Park. The access to the Pine is by three major trailheads: Pine River trailhead (Columbine RD), Poison Park trailhead (Pagosa RD) and Thirty Mile trailhead (Divide RD). From these trailheads the users travel to the Upper Pine and the side drainages to enjoy camping; fishing; peak bagging; hunting; viewing scenery, wildlife, and wildflowers in a primitive wilderness environment. It is a busy area of the Weminuche during the summer and also during hunting seasons. The Pine River Trail corridor and side drainages are used heavily by wilderness users with recreational.

There are 15 permits for outfitting in this area. The permits include the following activities: horseback rides, horse packing, multi-day backpacking and horseback trips, fishing, hunting, peak climbing, day hiking and environmental education. There is a minor amount of non-motorized winter activities that occur in this allotment.

There has been no grazing in this allotment since 1980 so there are currently no conflicts between wilderness users and sheep grazing.

Rock Creek Allotment

The Rock Creek Allotment has approximately 10,880 acres that are entirely in the Weminuche Wilderness, hosts the headwaters of Vallecito Creek with Hunchback Pass at the top of the Vallecito Trail (#529). In addition to the Vallecito Trail; Rock Creek Trail (#655) and Nebo Trail (#813) are system trails within this allotment. These system trails enable wilderness users to travel into the heart of the wilderness for multiple days and connect to other adjacent system trails including the Continental Divide National Scenic Trail. There are user-made trails up Stormy Gulch and to Vallecito. The lakes in the upper basins (Rock, Trinity, Vallecito and Nebo) are destinations for wilderness users as well as many peaks for technical climbs and walk ups.

There are 10 outfitters permitted in this allotment providing horse packing and backpacking opportunities and environmental education, fishing, and hunting activities.

There has been no grazing in this allotment since 1970 so there are currently no conflicts between wilderness users and sheep grazing.

Spring Gulch Allotment

None of the approximate 3,077 acres in this allotment are in the Weminuche Wilderness, and there are no developed trails or facilities. Spring Gulch Allotment is not very accessible to recreational users because of surrounding private land. Whatever recreational use occurs on this allotment likely only comes from adjacent landowners and is light use.

Tank Creek Allotment

This allotment is composed of 2,115 wilderness acres, and 9,769 non-wilderness acres. The Tank Creek Allotment is located mostly west and south of the Weminuche Wilderness boundary and north of Henderson Lake and Canyon Creek. The eastern boundary is the Lime Mesa Trail (#676) to Dollar Lake and Mountain View Crest with the western boundary at the Durango-Silverton narrow Gauge Railroad. There are user-made trails in this allotment, one up Tank Creek to access Mountain View Crest and another from the clear cuts in the Lime Mesa country to Dollar Lake and Mountain View Crest.

The sheep bed west of the Lime Mesa trailhead, and water at Dollar Lake, which causes some conflict with recreationists. There is some major head-cutting along the Lime Mesa Trail caused by shallow, granitic soils, an old 4x4 road and repeated sheep trailing and bedding. Due to the roughness of the access road, this part of the Weminuche sees low to moderate use. Users accessing the wilderness from this trailhead for multi-day trips will likely also encounter the sheep in the Virginia Gulch and Endlich Mesa Allotments.

There are impacts to the expected experiences of the wilderness users and archery hunters that hunt the Tank Creek and Stag Draw country. The expectations of both user groups may conflict with the current grazing practices occurring on the landscape.

There are five permitted outfitters within this allotment providing horse packing and back packing trips for the activities of hunting, fishing, viewing scenery, environmental education and enjoying solitude. Recreation activities in this area range from dispersed camping, firewood gathering, driving for pleasure, wilderness hiking and horseback trips, fishing, hunting and the viewing of summer wildflowers, scenery and wildlife.

Virginia Gulch Allotment

The Virginia Gulch allotment has approximately 13,033 acres that are entirely within the Weminuche Wilderness. System trails within this allotment include Burnt timber Trail (#667), Lime Mesa (#676), City Reservoir (#542), and Endlich Mesa (#534) providing access to Dollar Lake, Mountain View Crest, City Reservoir, Lake Marie and Trimble Pass into Johnson Creek. These trails provide access to each other for a loop trip or allow users to get deeper into the wilderness for multi-day trips by connecting with other system trails that allow travel into Johnson Creek, Needle Creek and all along the Vallecito Trail. These trails see moderate use in the summer and early hunting seasons. There are some sheep and user trails into the Oliver lakes country and up into Castilleja Lake.

Wilderness users to this area encounter not only the sheep in Virginia Gulch but also the sheep that are grazed in the Endlich Mesa, Burnt Timber and some of Tank Creek Allotments as most users travel through all of these allotments when on a wilderness trip. In this area of the Weminuche, there are conflicts between sheep and wilderness users, including visual impacts to vegetation including wildflowers, noise, and smell.

Where bedding grounds are located and trailing occurs, impacts to the vegetation and soil are evident. City Reservoir and Burnt timber trails have been used as a stock driveway since the 1920's and these trails are trenched, eroded and have up to six parallel trails in the open flat areas. As a hiker, it is difficult to stay on the trail in such a condition, hence hikers and horses exacerbate the problem by traveling on and off the trail. Also, the City Reservoir Trail is located such that drainage does not occur in flat wet meadows that have shallow soils. The sheep use these trails to access and move through to reach the suitable forage in the alpine ecosystem and also to exit this allotment.

This country is accessed by three trailheads, two of which are slow rough roads. Due to the remoteness, the use is moderate. During the summer and fall, there are 11 permits issued to outfitters that provide trips via foot or horse for camping, fishing, hunting, viewing scenery, peak climbing, solitude experiences, and environmental education courses.

Environmental Consequences

Alternative 1: No Term Livestock Grazing

Recreation impacts from the removal of livestock grazing in this landscape would eliminate the conflict that exists between recreationists and livestock grazing operations. There would be no sheep on system trails, no conflicts with guard dogs, no continued trailing and bedding and no sheep at popular lakes and destinations. The vegetation loss and soil compaction from trailing and bedding would restore itself over time, or at least be given the opportunity to heal. Burnt Timber and City Reservoir trails could be re-aligned and maintained and kept in better condition. More wildflowers would remain for viewing throughout the growing season. Those people who feel that a "primitive" or "pristine" experience in the backcountry or wilderness should not include sheep would have an improved experience. There would be no ability to restock vacant allotments (Rock, Leviathan, Pine River, Flint Creek, Cave Basin, Johnson Creek and Fall Creek) in the future. For the wilderness acres within this project area, the No Grazing Alternative would be the best for most wilderness users' desired experience.

Alternative 2: Current Management

Under this action alternative, the level of impacts on recreation in the project area would continue as they currently exist and would increase as the numbers of recreationists increase. For many visitors, the presence of sheep and cattle, the visible signs of grazing (trailing, trampling of vegetation and wildflowers), along with the noise and smell of sheep and cattle, and negative sheep dog encounters are undesirable. The solitude experience sought by many wilderness users may be impacted if during their trip, they encounter or camp within sight and sound of a band of sheep. Continuation of current livestock management would not change impacts to recreationists but conflicts and impacts would remain. The system trails, especially the Burnt Timber Trail, would continue being used and crossed by three bands of sheep resulting in continued damage to the trail tread and trail widening. Sheep trailing would continue to create and exacerbate non-system trails. Currently the sheep are trailed onto the Forest in the early summer and off in the fall using the same trails, campgrounds, roads and areas, causing double the impacts to the resources (vegetation, soils, and recreational users) in the same grazing season.

Within this analysis area, the seven vacant allotments in the Weminuche Wilderness are available to be re-stocked. If they were re-stocked, there would be impacts to the wilderness resources, both physical and social, that would appear to be new because of the length of time these allotments

have been vacant. Trailing to the vacant allotments would also cause conflicts; if they were trailed through Endlich Mesa or Burnt Timber and Virginia Gulch Allotments, it would compound the number of sheep encounters in these already-grazed areas. If they were then trailed through Trimble Pass and Columbine Pass down Johnson Creek to Vallecito Creek, these trails are located in narrow drainages heavily used by backpackers and horse packers. Trimble and Columbine Passes are also heavily used and could concentrate recreationalist and sheep. Trailing into the vacant allotments would create multiple trails and widen the existing trails. This would cause resource degradation, safety issues between stock users and sheep, and more conflicts with wilderness users and sheep evidence (smell, vegetation and wildflower trampling, campsite encounters).

Alternative 3: Adaptive Management /Forage Reserves

Through adaptive management, Forest Plan standards and guidelines would be met and desired conditions achieved in a timely manner. If these conditions are not met in a timely manner, then an alternate set of management actions would be taken to achieve the desired results. Short term and long term monitoring would help to inspect resource conditions, document them and correct social and resource concerns in a timely manner.

The Design Criteria that would be part of Alternative 3 contain many items that are designed to reduce conflicts with recreation, and help improve the vegetative conditions that influence the recreational experience. While these Design Criteria would not eliminate impacts to recreation, they would help to reduce negative impacts:

- No sheep bedding within ¼ miles of major lakes (City Reservoir, Stump Lakes, Castillia Lake, Lake Marie, and Lillie Lake, Dollar Lake, Emerald Lake, Pearl and Rudy Lakes).
- No bedding within ¼ mile of Burnt Timber Trail.
- Keeping sheep off of the Lime Mesa Trail and no camps within 200 yards of the trail.
- Bedding and camping away from higher-use recreational areas.
- Salting away from water, roads, trails, and other high-conflict use areas.
- Access is not permitted on the lower seven miles of Vallecito Trail.

Alternative 3 would benefit wilderness and recreational resources with the closure of the vacant allotments. Two of the allotments are proposed to be closed (Pine River, Flint Creek) and portions of four other allotments (Cave Basin, Rock Creek, Fall Creek and Johnson Creek). By closing these two allotments and portions of the other four, the user conflicts and resource impacts to the high alpine wilderness vegetation from sheep grazing would cease in the closed areas. These closures would help to attain the desired conditions for the resource and social standards set for the Weminuche Wilderness. Included in the areas proposed for closure are high-use recreation areas including the Pine River and all of the side drainages, Divide Lakes, Granite Lake, Flint Lake, Rock Lake, big and little Emerald Lakes, Moon Lake, and approximately 65 miles of system trails.

Alternative 3 would benefit wilderness and recreation resources by changing allotments from vacant to forage reserve status. Two-thirds of Rock Creek, all of Leviathan, most of Johnson Creek, and three-quarters of Cave Basin Allotments would become forage reserves. All these except Cave Basin would be available for sheep grazing; Cave Basin would be designated as cattle- only forage reserve. While these allotments have not been grazed for many decades, they are currently

considered vacant, and could potentially be re-stocked at any time. By designating them as forage reserves, the potential use would be decreased to a maximum of three years within a 10 year period.

If/when the forage reserves are grazed, impacts to the ecosystem and conflicts between sheep or cattle and wilderness users would occur similar to what currently occurs in active allotments. This would likely cause an outcry from recreationist because they will perceive the grazing to be a new use due to the length of time these allotments have been vacant. Trailing to the forage reserves would also cause conflicts because they would likely be trailed through Endlich Mesa or Burnt Timber and Virginia Gulch Allotments; then through Trimble Pass and Columbine Pass down to Johnson Creek then up the Vallecito Creek Trail at confluence with Johnson Creek to Rock Creek allotment, compounding the number of sheep encounters in these already-grazed areas. Johnson Creek and Vallecito Creek Trails are located in narrow drainages heavily used by backpackers and horse packers. Trimble and Columbine Passes are also heavily used and could concentrate recreationalist and sheep. The trailing into these forage reserves would create multiple trails and widen the existing trails. This would cause resource degradation, safety issues between stock users and sheep, and more conflicts with wilderness users and sheep evidence (smell, vegetation and wildflower trampling, campsite encounters).

If Canyon Creek Allotment continues to be used by cattle, Burnt Timber Trail would have one less band of sheep traveling the trail corridor and bedding near the trail corridor, near the campground and the trailhead. This would reduce the encounters between recreation users and sheep. A range rider for cattle would be required five days per week until fences are up and a rotational grazing system is working. Cattle grazing would occur only between June 15th and October 15th.

Re-drawing the boundaries of Tank Creek and Virginia Gulch Allotments to include some acres of the Needle Creek Allotment would cause conflicts between wilderness expectations and sheep impacts to the alpine ecosystem. These lake basins are popular recreation destinations, are high elevation (12,000 feet) ecosystems with a short growing season and most are accessed by non-system trails. Although sheep have already been grazing these areas, the proposal would bring that use under permit terms and conditions.

Alternative 4: Adaptive Management / Vacant Allotments with Restocking Requirements

The issues and concerns associated with Alternative 4 would be the same as those in Alternative 3 except there would be no forage reserves and the vacant allotments would not be re-stocked without meeting the specific restocking requirements, including more NEPA analysis. This would improve the wilderness resource into the future as there would be no new resource impacts or social conflicts in the vacant allotments without more analysis and public involvement. Another difference between Alternative 3 and 4 is that some allotment boundaries have been adjusted between the preceding EA and this EIS; some of those items that were proposed in the EA as changing allotment boundaries have already been accomplished administratively. This was done in order to correctly display the current condition and how the landscape is actually being used.

The Design Criteria that would be part of Alternative 4 contain many items that are designed to reduce conflicts with recreation, and help improve the vegetative conditions that influence the recreational experience. While these Design Criteria would not eliminate impacts to recreation, they would help to reduce negative impacts. As Alternative 4 would be the same as those in Alternative 3, the Design Criteria are also the same, with the following additional critieria:

- Sheep *or* cattle would be allowed to graze in the Spring Gulch, Burnt Timber, and Canyon Creek allotments.
- The Virginia Gulch allotment would remain as sheep only.
- The Tank Creek and Endlich Mesa Allotments would be sheep only, except for the southern 1/3 of the allotment which would be open to both sheep and cattle.

If cattle grazing were to occur in Burnt Timber Allotment, this would mean more use of an already impacted forest system trail. Recreationalist would experience greater impacts to the current trail while hiking. Some new range improvements south of the wilderness boundary would be needed. Recreationalist would see these new range improvements along roads and while traveling cross country while hiking or hunting.

Alternatives 3 and 4 both include plans to pursue bighorn sheep GPS collar monitoring. Most likely, this would include use of a helicopter to capture them, and would most likely occur in the wilderness where the bighorns reside most of the time. Motorized vehicle use is generally a prohibited activity in wilderness, and would require the prior analysis and approval by the FS Regional Office. However, helicopter use for capturing bighorns would be more of a theoretical impact to the wilderness recreational experience than an actual one; this is because the capture operations would occur during the winter at high elevations, a time and place in which there is virtually no recreation occurring, and would only last a few days.

Alternative 1 would be the best for the wilderness and recreation resources. Alternative 2 would not necessarily improve the wilderness resource or the recreation experience but would allow for the status quo. Alternative 3 could have both negative and positive effects on the recreation and wilderness resources. Alternative 4 would be the second best choice for the least impacts to the wilderness resource and recreational experience.

Cumulative Impacts

There are activities other than grazing that have, or could affect recreational and wilderness resources within the Weminuche Landscape. Foremost was the designation of the Weminuche Wilderness in 1975, which protects the majority of the landscape to preserve wilderness characteristics. This is a benefit to those recreationists who prefer primitive styles of recreation.

Past timber sales in the Missionary, Endlich Mesa, and Middle Mountain area have provided access roads into these areas which would otherwise not have been built. The presence of roads allows for recreational users to access the area for hunting, hiking, camping, and other uses.

Approximately 5,585 acres of the analysis area was burned by the 2002 Missionary Ridge Fire. The fire temporarily closed some trails as a result of massive erosion and safety concerns. While all the system trails are now opened, there could still be a threat to recreationists from falling dead trees or re-burn in downed timber, especially off-trail or outside of developed sites.

The Colorado Roadless Rule was passed in 2012, protecting an additional 13,585 acres of the landscape from certain activities. This will help to preserve the more primitive nature of those areas, but would prevent the development more roads or campgrounds.

Mandatory registration for wilderness was been proposed in 2013. Due to budget reductions, mandatory registration was not implemented in 2014 and is currently not planned for implementation, but may be proposed again at a later date. If mandatory registration is

implemented; this would not immediately affect recreational opportunities, but could eventually lead to some form of permit system in over-utilized wilderness locations.

There currently are no other future projects planned in the landscape that would have substantial impacts on recreational uses.

3.5 WILDLIFE – THREATENED AND ENDANGERED SPECIES

Affected Environment

A Biological Assessment (BA) was conducted to review, analyze, and document the direct, indirect and cumulative effects from domestic livestock grazing in the Weminuche Landscape to federally listed threatened or endangered fish and wildlife species, species proposed for federal listing, and critical habitat as designated by the U.S. Fish and Wildlife Service (USFWS). The BA addressed those listed species and/or their critical habitats that are known to occur or have the potential to be affected by actions occurring on the San Juan National Forest. Analyzing and disclosing effects of the alternatives for this grazing analysis project to federally listed species is needed to comply with the Endangered Species Act (*P.L. 93-205*), as amended; the National Forest Management Act (*P.L. 94-588, FSM 2670*); and the National Environmental Policy Act (*P.L. 91-190*), as amended.

Federally listed species addressed in the BA were from a list received from the USFWS (*USDI 2015*). A BA was competed for the draft EA that was originally written; the BA was later updated to reflect changes in species lists and in the proposed action for this DEIS. The full BA and Supplemental BA for this project can be found in the project record (*Schultz 2014, Schultz 2015a*). The USFWS concurred with the findings presented in the BA and Supplemental BA.

Table 3-3 and the narrative below summarize the findings of the BA and Supplemental BA for terrestrial wildlife species; see *Section 3.8 Fisheries,* of this document for discussion of findings for aquatic species.

As described in the Supplemental BA, there are three species proposed for listing under the ESA, but there is no designated critical habitat for any listed species in the Weminuche Landscape.

There is no designated critical habitat for any listed species in the Weminuche Landscape. There are seven species listed as threatened, endangered, or proposed for listing under the ESA that have the potential to occur or be affected by projects occurring on the Columbine Ranger District of the San Juan National Forest. Four of these species do not have habitat in the Weminuche Landscape and therefore would not be affected by the Preferred Alternative; Gunnison sage grouse, Mexican spotted owl, New Mexico meadow jumping mouse, Western yellow-billed cuckoo, humpback chub and bonytail. For this reason, these four species were dropped from further evaluation and the effects determination for them was “no effect”.

Table 3-3. Federally Listed Terrestrial Species for the SJNF

Species	Federal Status	Habitat Present In the Landscape?	Probability of Occurrence and/or Effects	Carried Forward for Further Analysis?	Project Effects Determination
Canada lynx	Threatened	Yes - mature spruce fir, cool-moist mixed-conifer, and willow - riparian areas; no designated linkage areas intersect with landscape	High - animals documented to occur in the landscape.	Yes, see discussion	May Effect, Not Likely to Adversely Affect
Gunnison sage grouse	Threatened	No – no suitable lek or brood reading habitat in landscape. Lek sites of low vegetation with sparse shrubs, often surrounded by big sagebrush, below 9,200' elevation. Brood rearing habitat of riparian vegetation and meadows within upland communities. Not known to occur on Columbine RD.	Low	No, dismissed from further evaluation.	No Impact
Mexican spotted owl	Threatened	No – no narrow rock-walled canyons with mixed-conifer	Low – no habitat in the landscape	No, dismissed from further evaluation	No Effect
New Mexico meadow jumping mouse	Endangered	No – no suitable complex streamside riparian in landscape.	Low	No, dismissed from further evaluation.	No Impact
Southwestern willow flycatcher	Endangered	Yes – 1 patch of marginal habitat occurs in forage reserve allotment	Low – birds not documented to occur during breeding season in or near the landscape, but habitat is present	Yes, see discussion	May Effect, Not Likely to Adversely Affect
Western yellow-billed cuckoo	Threatened	No – no gallery cottonwood forest in the landscape.	Low	No, dismissed from further evaluation.	No Impact
Uncompahgre fritillary butterfly	Endangered	Yes – 1 patch of habitat potentially suitable, but protocol surveys not conducted	High - 1 patch of habitat potentially suitable, but protocol surveys not conducted	Yes, see discussion	May Effect, Not Likely to Adversely Affect

Environmental Consequences

The Canada lynx, southwestern willow flycatcher and Uncompahgre fritillary butterfly are the only federally listed terrestrial wildlife species with habitat in the Weminuche Landscape or that could be affected by projects in the landscape. Therefore, these three species were carried forward for additional analysis. Information on the habitat requirements, status, distribution, abundance, threats, and key habitat components of these species is included in the BA and Supplemental BA and will not be repeated here.

For Canada lynx, there is a total of about 90,862 acres of lynx habitat within Lynx Analysis Units in the Weminuche Landscape, of which about 96% (86,817 acres) is suitable lynx habitat and 4% (4,045 acres) is lynx habitat currently in an unsuitable condition. Of the 86,817 acres of suitable lynx habitat in the landscape, 99% (86,475 acres) is suitable for livestock grazing under current

management (Alternative 2), and 25% (22,130 acres) is suitable for livestock grazing under the Preferred Alternative (Alternative 4). The landscape intersects five Lynx Analysis Units: the Lower Pine River, Missionary-Florida, Needles, Upper Pine River, and Vallecito Creek. The landscape does not intersect any mapped linkage areas.

For southwestern willow flycatcher, there is a total of about 410 acres of potential flycatcher habitat in the Weminuche Landscape. All of these potential flycatcher habitat acres are in areas considered suitable for livestock grazing under current management (Alternative 2) but none are in areas suitable for livestock grazing under the Preferred Alternative (Alternative 4). Of the 410 acres of potential flycatcher habitat, about 16 acres are in currently vacant allotments that are proposed to be included in a sheep forage reserve under Alternative 3, but restricted restocking under Alternative 4. Of the 16 acres in allotments proposed for forage reserve status under Alternative 3, only four acres are in areas suitable for domestic sheep grazing. The remaining 12 acres are in areas unsuitable for sheep grazing.

For Uncompahgre fritillary butterfly, there is one known butterfly colony in the Weminuche Landscape, although snow willow is widely distributed and relatively abundant in the alpine zone across the landscape. The landscape has been extensively surveyed for butterflies over many years and no new colonies have been located. There is however, one additional location in the landscape that appears to have suitable habitat attributes and the potential for butterfly occurrence seems high. This site has been visited but conclusive survey results have not been obtained. For this reason, until the site can be conclusively surveyed the site will be presumed to be occupied by butterflies and domestic sheep will be managed accordingly.

Alternative 1: No Term Livestock Grazing

Alternative 1, the No Grazing Alternative, would be wholly beneficial for federally listed species because domestic sheep and cattle grazing would not be re-authorized in the Weminuche Landscape. There would be no potential impacts from sheep grazing activities to key habitat components for listed species. Selection of Alternative 1 has the potential to provide direct benefits to listed species, but the degree of benefit would probably be small in any given year and limited in scale on the landscape. Benefits to listed species from selecting Alternative 1 would probably be long term (> 10 years). Benefits to listed species from selecting Alternative 1 would probably be most pronounced for Canada lynx and those suitable habitats at or near the spruce-fir forest/alpine interface. Benefits to Uncompahgre fritillary butterfly would be small and less than for Canada lynx because the one area where butterflies are known to occur in the landscape shows little sign of impacts from past sheep grazing and bedding practices and domestic sheep have not grazed this allotment since 1980. The allotment containing the patch of habitat thought suitable for butterflies has not been grazed since 1970 and shows little sign of past sheep grazing, trailing or bedding impacts. Field visits to the vacant allotments containing potential flycatcher habitat found low potential for occupancy, and all areas had not been grazed by sheep since prior to 1980 and showed few signs of past sheep grazing impacts. Because environmental reasons not related to sheep grazing indicate that potential for flycatcher occupancy is low, improvements in flycatcher habitat capability from selecting Alternative 1 are likely to be gradual, long term and limited to a few small locations.

Alternative 2: Current Management

Selecting Alternative 2 would have both neutral to gradually positive effects, and negative effects, for listed species. Selecting Alternative 2 would have neutral to gradually positive effects for listed

species because current livestock management practices would maintain current conditions (i.e. neutral effects) and are expected to maintain gradual improvement in habitat capability for some listed species across much of the landscape, especially when compared to historical livestock management practices. Alternative 2 would also have negative effects for listed species, compared to Alternative 1, because localized areas in active allotments where minor impacts are currently occurring would continue to be affected by livestock grazing activities, such as near the alpine/spruce-fir interface, moist alpine areas adjacent to riparian zones and wet meadows, and upland willow stands in alpine basins. Although sheep do not like to stand and/or graze long in saturated soils, continued trailing through wet areas could continue to cause localized effects on vegetation in some wet areas.

Selecting Alternative 2 would have negative effects for listed species, compared to Alternative 1, because minor and localized livestock grazing impacts to habitats for listed species would continue in some localized areas, and currently vacant allotments where impacts to habitats for listed species have not recently occurred would remain open and available for livestock grazing. Under Alternative 2, no cattle forage reserve would be authorized in the Cave Basin Allotment; therefore there would be no affects from authorized cattle grazing in this allotment under Alternative 2.

Selecting Alternative 2 would be generally neutral to gradually positive for listed species, but less than selecting Alternative 1 because improvement in habitat conditions would probably occur over a longer time frame and slower rate than under Alternative 1. In general, habitat conditions are expected to gradually improve under Alternative 2, but impacts to habitat for listed species would continue in some localized areas where grazing impacts are minor impacts are currently occurring. Selection of Alternative 2 is expected to result in continued gradual improvement in habitat conditions for listed species across most of the landscape, especially if most of the allotments remained vacant.

Under Alternative 2 about 35% of alpine and spruce-fir habitats are suitable for livestock grazing. Also for example, under Alternative 2, about 99% of suitable lynx habitat would be in areas suitable for livestock grazing. For these reasons, substantial portions of habitats for listed species would have potential for continued impacts from livestock grazing.

Alternative 3: Adaptive Management /Forage Reserves

Selecting Alternative 3 would have both neutral to positive effects, and negative effects, for listed species. Selecting Alternative 3 would have beneficial effects for listed species, compared to Alternative 2, because application of adaptive management strategies and project Design Criteria should result in more rapid improvements in habitat conditions in those localized areas where minor grazing impacts are currently occurring. Selecting Alternative 3 would be generally more beneficial for listed species than selecting Alternative 2, but less than selecting Alternative 1 because improvement in habitat conditions would probably occur over a longer time frame than under Alternative 1. Under Alternative 3 all of three vacant allotments would be closed (Fall Creek, Flint Creek and Pine River) and parts of five other allotments would also be closed (Canyon Creek, Cave Basin, Johnson Creek, Rock Creek and Tank Creek). These complete and partial closures would be entirely beneficial to habitats for listed species, though improvements would generally be small in scale, localized, and generally result in only minor improvements in habitat capability. In general, habitat conditions are expected to gradually improve in most areas under Alternative 3 but impacts to habitat for listed species would continue in some localized areas where livestock grazing is currently having minor impacts.

Selecting Alternative 3 would be more beneficial for listed species, compared to Alternative 2, because application of adaptive management strategies and project Design Criteria is expected to result in more rapid improvements in habitat conditions in those localized areas where sheep grazing impacts are impacting habitat conditions for listed species. Also similar to Alternative 2, Alternative 3 would have neutral to gradually positive effects for listed species, compared to Alternative 1, because those localized areas with minor grazing impacts would continue to be impacted by livestock grazing activities, such as near the alpine/spruce-fir interface, moist alpine areas adjacent to riparian zones and wet meadows, and upland willow stands in alpine basins. Although sheep do not like to stand and/or graze long in saturated soils, continued trailing through wet areas could continue to cause localized effects on vegetation in some wet areas. Although more rapid improvement in habitat conditions for listed species is expected under Alternative 3 than under Alternative 2, improvements in habitat conditions as a result of the adaptive management approach are likely to be too small to affect populations of listed species or the total amount of habitat available for listed species in the Weminuche Landscape.

Under Alternative 3, 18% of alpine and spruce-fir habitats would be suitable for livestock grazing, compared to 35% under Alternative 2, a 17% reduction under Alternative 3 in the amount of alpine and spruce-fir habitats suitable for livestock grazing. Under Alternative 3 only 34% of suitable lynx habitat in the Weminuche Landscape would occur in areas suitable for livestock grazing, compared to Alternative 2 where 99% of suitable lynx habitat is in areas suitable for livestock grazing.

Domestic livestock grazing does not appear to be having measurable direct or indirect effects to lynx habitat in closed-canopy spruce-fir and cool-moist mixed conifer forests in the Weminuche Landscape. In general, sheep and cattle spend little time in these areas because of the lack of forage under closed-canopy conifer forests. The few areas of noticeable sheep and cattle grazing impacts in closed-canopy spruce-fir forests were found to be small in scale and limited in scope where animals rested near the edges of parks or alpine zones. For this reason, domestic sheep grazing under Alternative 3 and Alternative 2 is not likely to substantially adversely impact habitat structure for lynx primary prey, such as younger age class conifers used by snowshoe hare in winter, or downed log piles and other woody debris used as hare cover and lynx denning habitat.

Most of the willow riparian areas (potential habitat for lynx and southwestern willow flycatcher) across the landscape are currently in upper mid-seral successional stage, or are in an upward trend and therefore are meeting land management plan direction for riparian condition. Little evidence of willow browsing was observed in willow dominated riparian areas at or near timberline and thus impacts to this lynx habitat component appears to be minor and localized. Sheep were observed browsing on willows in alpine riparian and upland willow sites and some heavy browsing was observed on willows in a few localized alpine areas. However in a few locations it was difficult to determine with certainty whether the primary cause of this browsing was domestic sheep or elk because both were present in some of these localized areas.

Evidence of historic sheep trailing activities was apparent in some alpine riparian and willow dominated upland areas, and these impacts would likely continue under Alternative 3. Overall, the effects of sheep grazing and trailing in riparian and wetland areas appears to be small and/or limited to localized areas. For these reasons, selecting Alternative 3 would be generally neutral to slightly beneficial for lynx and flycatcher habitat conditions, compared to Alternative 2, but the conditions would continue to improve over the long term (10+ years).

Under Alternative 3, the southern portion of the Cave Basin Allotment would be authorized for use as a cattle forage reserve. The impacts currently seen from past cattle activity would continue. Cows have a tendency to wallow and graze in riparian areas and wet meadows and riparian vegetation and fens are common in the Cave Basin Allotment. Negative impacts to these wet areas, which are also suitable lynx habitat, would be likely to continue and perhaps increase under permitted grazing opportunities, as compared to the occasional current unauthorized use by animals that stray into the area from an adjacent permitted cattle allotment.

Under Alternative 3 a "restricted area" polygon has been delineated around the area where Uncompahgre fritillary butterfly might occur. Under Alternative 3, domestic sheep activities would be restricted to allow only trailing under controlled circumstances through this polygon; no bedding, salting or intentional grazing would be permitted within the polygon. This would ensure that intentional sheep grazing does not degrade butterfly key habitat attributes. This "restricted area" polygon was designed to have boundaries that could be readily identified on the ground by sheep herders managing the flocks.

Selecting Alternative 3 would be less beneficial for listed species than selecting Alternative 1. This is because five active allotments (Burnt Timber, Canyon Creek, Endlich Mesa, Tank Creek and Virginia Gulch) and four forage reserve allotments (Cave Basin/Cattle, Johnson Creek/sheep, Leviathan/sheep and Rock Creek/sheep) with habitat for listed species would remain open or available for livestock grazing under Alternative 3 but would not be available for livestock grazing under Alternative 1.

Alternative 3 would be more beneficial for listed species than selecting Alternative 2. This is because three vacant sheep allotments available for restocking under Alternative 2 (Fall Creek, Flint Creek and Pine River) would be closed to livestock grazing under Alternative 3. These three allotments have substantial amounts of suitable habitats for lynx and southwestern willow flycatcher in areas mapped as suitable for livestock grazing.

Alternative 4: Adaptive Management / Vacant Allotments with Restocking Requirements

Selecting Alternative 4 would have both neutral to positive effects, and negative effects, for listed species. Selecting Alternative 4 would have neutral to beneficial effects for listed species, compared to Alternative 2 because application of adaptive management strategies and project Design Criteria should result in more rapid improvements in habitat conditions in those localized areas where minor grazing impacts are currently occurring.

Selecting Alternative 4 would have neutral to beneficial effects for listed species, compared to Alternative 3, because there would be no forage reserves authorized under Alternative 4. Selecting Alternative 4 would be generally beneficial for listed species, more so than selecting Alternative 2 or Alternative 3, but less than selecting Alternative 1, because improvement in habitat conditions would probably occur over a longer time frame than under Alternative 1 and no forage reserves would be authorized. Under Alternative 4, all of seven currently vacant allotments (Cave Basin, Fall Creek, Flint Creek, Johnson Creek, Leviathan, Pine River and Rock Creek) would not be re-stocked without meeting the specific restocking requirements, and without conducting further NEPA analysis. Parts of two other allotments currently active allotments (Canyon Creek and Tank Creek) would be removed from those allotments. These restrictions would be entirely beneficial to habitats for listed species, though improvements would generally be small in scale, localized, and generally result in only minor improvements in habitat capability. In general, habitat

conditions are expected to gradually improve in most areas under Alternative 4, but impacts to habitat for listed species would continue in some localized areas where livestock grazing is currently having minor impacts.

Selecting Alternative 4 would be more beneficial for listed species than selecting Alternative 3, and much more beneficial than Alternative 2. This is because application of adaptive management strategies and project Design Criteria is expected to result in more rapid improvements in habitat conditions in those localized areas where grazing activities are impacting habitat conditions for listed species. Under Alternative 4 there would be no forage reserves authorized, compared to Alternative 3, and thus selecting Alternative 4 would be more beneficial for listed species that selecting Alternative 3.

Selecting Alternative 4 would have negative effects for listed species, compared to Alternative 1, because those localized areas of grazing impacts would continue to be degraded by livestock grazing activities, such as near the alpine/spruce-fir interface, moist alpine areas adjacent to riparian zones or wet meadows, and upland willow stands in alpine basins. Although more rapid improvement in habitat conditions for listed species is expected under Alternative 4 than under Alternative 3 or under Alternative 2, improvements in habitat conditions as a result of the adaptive management approach are likely to be too small to affect populations of listed species or the total amount of habitat available for listed species in the Weminuche Landscape.

Under Alternative 4, 15% of alpine and spruce-fir habitats in the Weminuche Landscape would be suitable for livestock grazing, compared to 18% under Alternative 3 and 35% under Alternative 2. Under Alternative 4 only 25% of suitable lynx habitat in the Weminuche Landscape would occur in areas suitable for livestock grazing, compared to 34% under Alternative 3 and 99% under Alternative 2. For these reasons, selecting Alternative 4 would reduce the amount of lynx habitat in areas suitable for livestock grazing by 9% compared to Alternative 3 and by 74% compared to Alternative 2.

Domestic livestock grazing does not appear to be having measurable direct or indirect effects to lynx habitat in closed-canopy spruce-fir and cool-moist mixed conifer forests in the Weminuche Landscape. In general, sheep and cattle spend little time in these areas because of the lack of forage under closed-canopy conifer forests. The few areas of noticeable sheep and cattle grazing impacts in closed-canopy spruce-fir forests were determined to be minor in intensity, small in scale and limited in scope to where animals rest near the edges of parks or alpine zones. For this reason, domestic sheep grazing under Alternative 4 is not likely to substantially adversely impact habitat structure for lynx primary prey, such as younger age class conifers used by snowshoe hare in winter, or downed log piles and other woody debris used as hare cover and lynx denning habitat.

Most of the willow riparian areas (potential habitat for lynx and southwestern willow flycatcher) across the landscape are currently in upper mid-seral successional stage, or are in an upward trend and therefore are meeting land management plan direction for riparian condition. Little evidence of willow browsing was observed in willow dominated riparian areas at or near timberline and thus impacts to this lynx habitat component appears to be minor and localized. Sheep were observed browsing on willows in alpine riparian and upland willow sites and some heavy browsing was observed on willows in a few localized alpine areas. However in a few locations it was difficult to determine with certainty whether the primary cause of this browsing was domestic sheep or elk because both were present in some of these localized areas.

Evidence of historic sheep trailing activities was apparent in some alpine riparian and willow dominated upland areas, and these impacts would likely continue under Alternative 4. Overall, the effects of sheep grazing and trailing in riparian and wetland areas appears to be small and/or limited to localized areas. For these reasons, selecting Alternative 4 would be generally beneficial for lynx and flycatcher habitat conditions, compared to Alternatives 3 and 2, but the conditions would continue to improve over the long term (10+ years).

Under Alternative 4, the southern portion of the Cave Basin Allotment would not be authorized for use as a cattle forage reserve, as it would be under Alternative 3. The impacts currently seen from past cattle activity would continue but no new impacts would be expected, as they would be under Alternative 3. Cattle impacts that would be expected under Alternative 3 but not under Alternative 4 include riparian areas and wet meadows and riparian vegetation and fens which are common in the Cave Basin Allotment and are also suitable lynx habitat. Under Alternative 4, cattle impacts are limited to occasional unauthorized use by animals that stray into the area from an adjacent permitted cattle allotment.

Alternative 4 would be entirely beneficial to Uncompahgre fritillary butterfly because the area where butterflies might occur would not be authorized as a sheep forage reserve, as it would be under Alternative 3.

Selecting Alternative 4 would be more beneficial for listed species than selecting Alternative 3, and much more beneficial than selecting Alternative 2, although less beneficial than selecting Alternative 1. Under Alternative 4, a total of five allotments with habitat for listed species would remain active and open for livestock grazing, compared to nine allotments under Alternative 3 and twelve allotments under Alternative 2.

Alternative 4 would be more beneficial for listed species than selecting Alternative 3. This is because four vacant sheep allotments available for restocking as forage reserves under Alternative 3 would not be re-stocked without meeting the specific restocking requirements and further NEPA analysis under Alternative 4. These four allotments have substantial amounts of suitable habitats for lynx and southwestern willow flycatcher in areas mapped as suitable for livestock grazing.

Threatened and Endangered Terrestrial Species Determinations

The effects of the Preferred Alternative on federally threatened and endangered species and their critical habitats were determined in the Biological Assessments (*Schultz 2014, 2015a*). There is no critical habitat for any listed species in the landscape. A determination of "May Effect, Not Likely to Adversely Affect" was made for the Canada lynx, southeastern willow flycatcher, and the Uncompahgre fritillary butterfly. A "No Effect" determination was made for all other listed terrestrial species. Aquatic effects determinations are discussed in the Fisheries section of this EIS.

Cumulative Impacts

Changes to lynx habitat located in the Weminuche Wilderness have been mostly from the natural disturbance processes that predominate across the Weminuche Wilderness. Because most of the analysis area is located in the designated wilderness, there has been only minimal alteration of lynx habitat from human activities. Recreation activities (horseback riding, camping, hunting, fishing, backpacking, etc.) in the wilderness have likely resulted in some minor loss of lynx habitat, but the degree of impact is likely insignificant and discountable when compared to the large expanses of suitable lynx habitat that receive minimal human visitation due to their remoteness

and difficult access. Wilderness management regulations should ensure continued minimal impact of human activities on lynx habitat conditions.

Lynx habitat located outside the Weminuche Wilderness has been moderately affected from historic spruce-fir timber harvest, primarily in the Canyon Creek, Tank Creek, Burnt Timber, and Endlich Mesa allotments. Timber harvest removed and fragmented habitat for species associated with closed-canopy, multi-storied spruce-fir forests such as lynx, snowshoe hare, and red squirrel. In addition, roads constructed for timber harvest activities have increased human presence and the potential for disturbance to lynx. However, the long-term impact of roads on lynx habitat is likely to have been small when compared to the large amounts of un-roaded lynx habitat available across the Weminuche Wilderness.

More localized threats to listed species restricted to alpine zones, such as Uncompahgre fritillary butterfly, include non-motorized recreation. While alpine ecosystems are hardy and resilient to natural environmental factors, they are particularly vulnerable to human related disturbances and may require decades to recover. Although substantial progress has been made in developing techniques to restore damaged alpine landscapes, this technology is still not capable of restoring alpine plant communities to their pre-disturbance condition (*Hoffman 2006*).

As the number of off-highway vehicles (OHV's) continues to increase on most roads and OHV trails within and immediately adjacent to the Weminuche Landscape primarily in the Canyon Creek, Tank Creek, Burnt Timber and Endlich Mesa Allotments, the potential for disturbance to lynx using areas adjacent to popular OHV routes also increases. The continual annual increase in OHV use observed over the past 10+ years is likely to continue for the foreseeable future. Non-motorized recreation has also increased each year on most trails in the Weminuche Landscape. Human disturbance in habitats for listed species may cause animals to move away from preferred foraging areas and into areas with lower quality forage or areas where animals are more vulnerable to predation, leading to increased predation or mortality.

Late spring motorized use of roads and motorized trails through denning and winter foraging habitat could have negative effects if lynx are forced to move kittens because of associated human disturbance (*Ruggiero et al. 2000*). Increased human recreation resulting in more human encounters has potential to increase lynx mortality. Numbers of motorized users on roads in the landscape is expected to continue to increase for the foreseeable future, likely resulting in public requests for improvements and expansion of motorized routes. The cumulative effect of increased motorized users and potential infrastructure development on the habitat capability of listed species is unknown.

Influences that continue to affect vegetation in the Weminuche Landscape and therefore affect habitat capability for listed species include ongoing fire suppression, personal use firewood harvesting of standing dead trees for use as primary home heating purposes, and natural events such as wild fire, forest insect and disease outbreaks, wind throw events, and avalanches. All these activities have contributed to changes in the composition, structure, and function of forested habitats in the landscape, and habitat for listed species, primarily Canada lynx.

Intensive historic levels of livestock grazing, increasing levels of OHV traffic on most roads and motorized trails in and immediately adjacent to the landscape, development of private lands within

surrounding Federal lands, water diversion, and 100 years of surface and subsurface mining operations have likely contributed to cumulative effects in lynx and flycatcher habitats. Some of the impacts of these past activities have been reduced or mitigated through natural re-vegetation of formerly impacted areas. As stated above, the effects of the proposed action, including the cumulative effects, have been determined to not likely adversely affect the lynx, and not affect the other species at all.

3.6 WILDLIFE – SENSITIVE SPECIES

Forest Service Manual (FSM) 2670 requires reviews of all Forest Service planned, funded, executed or permitted programs and activities for possible effects to Forest Service designated sensitive wildlife species. The process used to evaluate the effects agency activities and programs may have on designated sensitive species is in accordance with the standards established in 50 CFR 402.12, and Forest Service Manual Direction (FSM 2672.4). U.S. Forest Service (USFS) Region 2 sensitive species are designated by the Regional Forester of the Rocky Mountain Region (*USDA 2015*). A Biological Evaluation (BE) was conducted to analyze the impacts of alternatives to designated sensitive species following agency direction (*Schultz 2015b*).

Table 3-4 lists the species designated as Sensitive that are known to occur, may occur, or have habitat on FS lands managed by the San Juan National Forest. The table also provides a summary of how the Preferred Alternative might affect each species and their key habitat components, and impact determinations for each species. Specific project impacts are discussed in more detail for those species with habitat present in the Weminuche Landscape and that are likely to be affected (positively or negatively) by the action alternatives. Details of the analysis leading to the summary can be found in the project record. Information on the habitat requirements, status, distribution, abundance and key habitat components of FS designated Sensitive Species is on file at the Columbine Ranger District office in Bayfield, Colorado and will not be reviewed here.

There are 31 species identified as Sensitive on the Region 2 Sensitive Species list. Some species are not present in the Weminuche Landscape due to the absence of suitable habitat, or, suitable habitat is present in the landscape but the three action alternatives would not affect the species or its key habitat components. Table 3-4 provides rationale for why some sensitive species were brought forward for detailed project analysis and other species were not.

Affected Environment

Of the 31 species designated as Sensitive that have potential to occur in the Weminuche Landscape or be affected by the Preferred Alternative, 14 have habitat and are known to occur or may occur in the landscape. Of these 14 Sensitive species, only three species have habitat present in the Weminuche Landscape and could be affected by livestock grazing. The three species brought forward for detailed analysis for this domestic sheep grazing project are: North American wolverine, Rocky Mountain bighorn sheep, and white-tailed ptarmigan.

The remaining 28 species either do not have habitat in the Weminuche Landscape, are not known to occur in the landscape, do not regularly breed in or use the landscape or occur only irregularly and unexpectedly and often outside of habitat associations characteristic of the species, or domestic livestock grazing is unlikely to substantially affect their preferred habitats or key habitat components. For these reasons, these 28 species will not be evaluated further and the effect of selecting any of the project alternatives on these 28 species is “no impact”.

Table 3-4. FS Region 2 Terrestrial Sensitive Wildlife Species for the SJNF

Species	Habitat Present In Project Area (PA)?	Species or Habitat Impacted?	Basic Habitat Description	Project Impact Determination
MAMMALS				
American marten	Yes – known to occur year round in landscape. About 71,020 acres of habitat in landscape	No - foraging habitat generally not affected by sheep grazing	Mature spruce/fir and mixed conifer forests with complex physical structure.	Alternative 2, 3 or 4 will have "**no impact"** on American marten. No further analysis is required
Desert Bighorn Sheep	No – no desert canyons in landscape, not known to occur in San Juan, Hinsdale or La Plata County	No	Rocky canyons, grass, low shrub, open habitat with adjacent steep rocky areas for escape and safety. Might occur on Dolores RD; does not occur on Columbine or Pagosa RDs.	Alternative 2, 3 or 4 will have "**no impact"** on desert bighorn sheep. No further discussion is required
Fringed myotis	No – Landscape too high in elevation, not known to occur in landscape	No	Desert, grassland, and woodland habitats. Roosts in caves, mines, rock crevices, buildings, and other protected sites.	Alternative 2, 3 or 4 will have "**no impact"** on Fringed myotis. No further discussion is required
Gunnison's prairie dog	No – no suitable extensive grassland or prairie dog colonies in landscape not known to occur in SJ or Hinsdale Co.s	No	High mountain valleys and plateaus at 1830-3660 m; open or slightly brushy country, scattered junipers and pines. Burrows usually on slopes or in hummocks.	Alternative 2, 3 or 4 will have "**no impact"** on Gunnison's prairie dog. No further discussion is required
Hoary Bat	No –too high in elevation, not known to occur in San Juan or Hinsdale Co.	No	Associated with foliage in trees, mainly ponderosa pine, piñon/juniper and riparian forest.	Alternative 2, 3 or 4 will have "**no impact"** on hoary bat. No further discussion is required
North American wolverine	Yes – denning and foraging habitat present in landscape, but not confirmed to occur in San Juan or Hinsdale counties in past 50 years		Yes – foraging habitat possibly affected by sheep grazing	Alternatives 2, 3 or 4 "**may impact individual wolverines but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability rangewide**".
River Otter	Yes – known to occur in and near the main stem Pine River. About 121.9 miles of river habitat in landscape.	No - will not alter aquatic habitat structure or primary prey abundance or distribution	Stream and river riparian	Alternative 2, 3 or 4 will have "**no impact"** on river otter. No further discussion is required
Rocky Mountain bighorn sheep	Yes – known to occur in landscape year round. About 38,767 acres of mapped (CPW) summer range in landscape.	Yes – potential for disease transmission with domestic sheep, and potential for forage competition	Open or semi-open habitats, often in precipitous terrain and the adjacent benches and mesa tops, most commonly in alpine, grassland, shrub-steppe and rocky areas.	Alternative 2, **"may adversely impact individual Rocky Mountain bighorn sheep and is likely to result in a loss of viability on the planning area, in a trend to federal listing, or in a loss of species viability rangewide".** Alternative 3 or 4 "**may impact individual bighorn sheep but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability rangewide."**
Spotted bat	No – too high elevation, not known to occur in SJ Co.	No	Pinon-juniper, shrub desert, possibly riparian.	Alternative 2, 3 or 4 will have "**no impact"** on spotted bat. No further discussion is required
Townsend's big-eared bat	No – Landscape too high in elevation, no open dry forests	No	Forages in semi-desert shrublands, pinon-juniper woodlands and open montane forests. Roosts in caves, mines and mature forests.	Alternative 2, 3 or 4 will have "**no impact"** on Townsend's big-eared bat. No further discussion is required

Species	Habitat Present In Project Area (PA)?	Species or Habitat Impacted?	Basic Habitat Description	Project Impact Determination
BIRDS				
American bittern	No – no marsh, swamp, or bog with cattails, rushes, grasses, & sedges, not known to occur in San Juan or Hinsdale County	No	Marsh, swamp, or bog with cattails, rushes, grasses, & sedges	
American peregrine falcon	Yes – suitable foraging habitat, one nest known in the landscape.	No –foraging habitat) generally not affected by sheep grazing	Cliff habitat over 200 feet high with suitable ledges for nest construction.	Selecting Alternative 2, 3 or 4 will have "**no impact"** on American peregrine falcon. No further analysis is required.
Bald eagle	Yes – suitable foraging habitat, one nest known just outside the landscape.	No – foraging habitat generally not affected by sheep grazing.	Nests and roosts are usually found in open-branched trees near larger lakes, streams, rivers and reservoirs.	Selecting Alternative 2, 3 or 4 will have "**no impact"** on bald eagle. No further analysis is required.
Black swift	Yes – known to nest and forage in landscape	No – nesting (waterfalls) and foraging habitat (in air above alpine peaks) not affected by sheep grazing	Nests behind or next to waterfalls and wet cliffs. Forages over forests and open areas.	Selecting Alternative 2, 3 or 4 will have "**no impact"** on black swift. No further analysis is required.
Boreal owl	Yes – known to nest and occur year round in the landscape. About 50,439 acres of habitat in landscape.	No – nesting habitat (standing dead trees) and foraging habitat (closed-canopy spruce-fir forests) generally not affected by sheep grazing	Mature spruce/fir and mixed conifer forested areas with preference for wet situations (bogs or streams) for foraging	Selecting Alternative 2, 3 or 4 will have "**no impact"** on boreal owl. No further analysis is required.
Brewer's sparrow	No – no sagebrush in landscape; not known to occur in San Juan or Hinsdale County	No	Strongly associated with sagebrush in areas with scattered shrubs and short grass; to lesser extent in mountain mahogany, rabbit brush, and bunchgrass grasslands with shrubs or large openings in pinon-juniper.	Selecting Alternative 2, 3 or 4 will have "**no impact"** on Brewer's sparrow. No further analysis is required.
Burrowing owl	No – no suitable extensive grassland or prairie dog colonies in landscape not known to occur in San Juan, Hinsdale or La Plata County	No	Open grasslands associated with prairie dogs. Nests and roosts in burrows dug by mammals or other animals. Not known to occur on Columbine or Pagosa RDs.	Selecting Alternative 2, 3 or 4 will have "**no impact"** on burrowing owl. No further analysis is required.
Columbian sharp-tailed grouse	No – no habitat in landscape; not known to occur in San Juan, Hinsdale or La Plata County	No	Oak/service berry shrublands, often interspersed with sagebrush; aspen forests; irrigated pasture. Recently reintroduced near Dolores, not known to occur on Columbine or Pagosa RDs.	Selecting Alternative 2, 3 or 4 will have "**no impact"** on Columbian sharp-tailed grouse. No further analysis is required.

Species	Habitat Present In Project Area (PA)?	Species or Habitat Impacted?	Basic Habitat Description	Project Impact Determination
Ferruginous hawk	No – no suitable extensive grassland or prairie dog colonies in landscape; not known to occur in San Juan or Hinsdale County	No	Open grasslands and shrub steppe communities. Nests in tall trees or shrubs along streams or on steep slopes. Not known to nest on or near SJNF, but is winter visitor and can occur during non-breeding season.	Selecting Alternative 2, 3 or 4 will have "**no impact"** on ferruginous hawk. No further analysis is required.
Flammulated owl	Yes – known to nest in the landscape. About 16,744 acres of habitat in landscape.	No – nesting habitat (standing dead trees) and foraging habitat (mixed-conifer and ponderosa pine forests) generally not affected by sheep grazing	Depend on cavities for nesting, open forests for foraging, brush for roosting. Occupy open ponderosa pine or forests with similar features (dry montane conifer or aspen, with dense saplings).	Selecting Alternative 2, 3 or 4 will have "**no impact"** on flammulated owl. No further analysis is required.
Lewis' woodpecker	No – no suitable mature ponderosa pine or gambel oak in landscape, not known to occur in San Juan or Hinsdale County	No	Open pine forests, burnt over areas with snags and stumps, riparian and rural cottonwoods, and pinon-juniper woodlands.	Selecting Alternative 2, 3 or 4 will have "**no impact"** on Lewis' woodpecker. No further analysis is required.
Loggerhead shrike	No – no sagebrush or thorn shrub habitats in landscape, not known to occur in San Juan or Hinsdale County	No	Grassy pastures that are well grazed. Nests in shrubs or small trees, preferably thorny such as hawthorn.	Selecting Alternative 2, 3 or 4 will have "**no impact"** on loggerhead shrike. No further analysis is required.
Northern goshawk	Yes – foraging and nesting habitat in landscape, known to nest in the landscape. About 64,855 acres of habitat in landscape.	No – nesting habitat not affected, and, foraging habitat generally not affected by sheep grazing	Mature forest generalist, often found in mixed conifer/aspen stands.	Selecting Alternative 2, 3 or 4 will have "**no impact"** on northern goshawk. No further analysis is required.
Northern harrier	No - no suitable wetlands or cattail marshes in landscape, not known to nest in San Juan Hinsdale County	No	Marshes, meadows, grasslands, and cultivated fields. Nests on the ground, commonly near low shrubs, in tall weeds or reeds, sometimes in bog; or on top of low bush above water, or on knoll of dry ground, or on higher shrubby ground near water, or on dry marsh vegetation.	Selecting Alternative 2, 3 or 4 will have "**no impact"** on northern harrier. No further analysis is required.
Olive-sided flycatcher	Yes – suitable nesting habitat in landscape, known to nest in landscape. About 21,129 acres of habitat in landscape.	No – nesting habitat and foraging habitat generally not affected by sheep grazing	Mature spruce/fir or Douglas-fir forests with preference for natural clearings, bogs, stream, and lake shores with water-killed trees, forest burns and logged areas with standing dead trees.	Selecting Alternative 2, 3 or 4 will have "**no impact"** on olive-sided flycatcher. No further analysis is required.
Purple martin	No – no suitable mature aspen stands in landscape, not known to nest in San Juan, Hinsdale or La Plata County	No	Mature pure aspen stands near streams, springs, or ponds. Breeds on Dolores RD. Not known to occur on Columbine or Pagosa RDs.	Selecting Alternative 2, 3 or 4 will have "**no impact"** on purple marten. No further analysis is required.

Species	Habitat Present In Project Area (PA)?	Species or Habitat Impacted?	Basic Habitat Description	Project Impact Determination
Short-eared owl	No - no suitable wetlands or cattail marshes in landscape, not known to nest in San Juan or Hinsdale County	No	Open habitats including grasslands, marsh edges, shrub-steppe, and agricultural lands; requires taller grass cover than Northern harrier	Selecting Alternative 2, 3 or 4 will have "**no impact"** on short-eared owl. No further analysis is required.
White-tailed ptarmigan	Yes- known to occur year round in landscape. About 48,200 acres of habitat in landscape.	Yes – nesting and foraging habitat (willows) shows evidence of localized impacts from sheep grazing	Alpine tundra, especially in rocky areas with sparse vegetation. Summer habitats include moist, low-growing alpine vegetation. Canopy cover of willow at winter feeding sites preferred.	Selecting Alternative 2, 3 or 4 "**may impact individual white-tailed ptarmigan but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability rangewide**".
AMPHIBIANS				
Boreal toad	Yes – suitable habitat and one historic site in landscape. Not known to currently occur in landscape. About 3,567 acres of potential habitat in landscape, of which 46% is in areas suitable for grazing.	No – no evidence that sheep grazing is substantially altering aquatic habitat structure	Wetlands in spruce/fir forest, near water and alpine meadows.	Selecting Alternative 2, 3 or 4 will have "**no impact"** on boreal toad. No further analysis is required.
Northern leopard frog	Yes – possibly occurs at lowest elevations of landscape. About 3,567 acres of habitat in landscape, of which 46% is in areas suitable for grazing.	No – no evidence that sheep grazing is substantially altering aquatic habitat structure	Riparian and wetland areas.	Selecting Alternative 2, 3 or 4 will have "**no impact"** on northern leopard frog. No further analysis is required.
INSECTS				
Great Basin silverspot	No – Landscape is too high in elevation, not known to occur in San Juan or Hinsdale County.	No	Spring fed and/or subirrigated wetlands at low (7500 feet or less) elevation; larval food plant Viola nephrophylla; wet meadows interspersed with willows and other woody wetland species; adult nectar sources (mostly composites).	Selecting Alternative 2, 3 or 4 will have "**no impact"** on great basin silverspot. No further analysis is required.

Existing habitat for sensitive species was determined by the use of Geographical Information System (GIS) modeling using vegetative information described in Forest-wide MIS Assessments on National Forest System lands. Habitat modeling was conducted using habitat structural stage matrices described by Towry (*1984*). In addition, information on species' distribution across the Forest, professional judgment of Forest Service wildlife biologists, coordination with CPW biologists, coordination with the USFWS, and field reconnaissance of the project area was also used.

North American Wolverine

In August of 2014, the USFWS withdrew a short-lived listing proposal that had been in place for the wolverine. After the listing withdrawal, wolverine was added back onto the list of species designated as Sensitive in the U.S. Forest Service's Rocky Mountain Region.

The wolverine is the largest member of the weasel family with adult males weighing 26 to 40 pounds (*USDI FWS 2013b*). It resembles a small bear with a bushy tail. Wolverines are opportunistic feeders, consuming a variety of live foods but primarily scavenging carrion. They have an excellent sense of smell enabling them to find food buried beneath deep snow.

Wolverine distribution in North America appears to be highly associated with the existence of persistent spring snow cover during the end of the denning period, mid-April through mid-May. Females dig natal dens primarily in snow-covered boulder talus in subalpine cirque basins. Use of natal dens begins in early February through late March, with use continuing through April and into May. Denning habitat in areas of deep persistent spring snow pack may be a limiting and critical component of wolverine habitat, especially when viewed in conjunction with the potential for displacement and disturbance of denning females by human winter recreational activities. Den abandonment has been reported as a common response to disturbance in the U.S. and Finland. However, research has failed to document differences in wolverine density, habitat use or behavior patterns between wilderness areas and non-wilderness areas. Denning occurs prior to when domestic sheep are turned into allotments in the Weminuche Landscape. It is generally accepted that wolverines require large areas of unfragmented range and habitat (*Banci 1994, Aubry et al. 2007, Copeland 1996, 2010, Magoun and Copeland 1998, USDI 2003, 2013b*).

Wolverines occur at very low densities even under optimal conditions, have very large home ranges, and can travel long distances over rough terrain and deep snow. The current occupied range in the contiguous United States is not well known but thought to include Idaho, Montana, Oregon, Washington, Wyoming, and possibly California. Historic range also included Colorado, Maine, Michigan, Minnesota, New Hampshire, New York, North Dakota, Utah, and Wisconsin (*USDI 2013b, Banci 1994, Aubry 2007, Copeland 2010, Inman 2009*). Colorado Parks and Wildlife lists the current status of wolverine in the state as Endangered (*CPW 2015*).

The Weminuche Landscape has not been documented to be currently occupied by wolverine. Prior to 2009, the last known wolverine in the state was documented in 1919. Recent surveys by CPW have failed to detect the presence of wolverine in or near the landscape. There are however, nearly annual reports, all unconfirmed, of wolverine sightings from the central San Juan Mountains, mostly between Silverton, Ouray and Lake City (*Wait 2007*). It is possible that wolverines may exist on the landscape even though they have not been confirmed.

An aerial habitat inventory by a CPW and wolverine researcher determined that the central San Juan Mountains appeared to provide some of the highest quality potential wolverine habitat in the state (*Wait* 2007). A 1998 planned reintroduction of wolverine by CPW selected the San Juan and Rio Grande National Forests as the preferred reintroduction site because of its extensive area of alpine terrain (about 971 square miles), abundant potential denning sites in wilderness areas with deep snows remaining into late spring, abundant big game populations and presumed carrion availability, and moderate human impact. This area includes the entire Weminuche Landscape.

Rocky Mountain Bighorn Sheep

Rocky Mountain bighorn sheep were historically distributed across the mountainous portions of Colorado and much of the SJNF. Their Sensitive species designation implies there is concern for the long-term viability and/or conservation status of bighorn sheep on FS lands in the Region. This concern is based primarily on potential threats to the long-term viability of bighorn sheep populations, including diseases transmitted from domestic sheep, lack of connectivity between bighorn herds, and/or loss of genetic variability (fitness) due to habitat fragmentation, habitat loss, increased human disturbance on summer and winter grounds, competition for forage with domestic livestock, and predation on small isolated herds (*SJNF 2013a, Beecham 2007*). Although habitat degradation from fire suppression, highways, livestock grazing, and human disturbance is of concern, the susceptibility of bighorn sheep herds to population declines or extirpation due to respiratory diseases, which can be transmitted by domestic sheep or goats (*Besser 2012b, Cassirer 2013*), appears to be the greatest concern for bighorn sheep population persistence on the SJNF (*SJNF 2013a*).

Mortality of all age classes and depressed lamb recruitment resulting from pathogens introduced by domestic livestock are regarded as the primary limiting factor for bighorn sheep in Colorado (*George 2009*). Physical contact between domestic sheep or goats and bighorn sheep increases the risk of disease transmission from domestic animals to bighorn sheep (*Sells 2015, Lawrence 2010, Wehausen 2011*), with potential for a subsequent bighorn sheep mortality event and/or extended period of reduced recruitment (*Besser 2012b*).

The primary disease agents are respiratory diseases to which domestic sheep and goats are typically resistant or unaffected, and to which bighorn sheep have little resistance (*Carpenter 2014, Cassirer 2013, Besser 2012a and 2012b, CAST 2008, George 2008, WAFWA 2012*). Pneumonia caused by bacterial respiratory pathogens is considered the most virulent disease impacting bighorn sheep today (*Besser 2012b, George 2009, Beecham 2007*). Pneumonia can result in all age die-offs followed by suppressed lamb recruitment for up to several decades after the initial die-off (*TWS 2015, George 2008*). Survivors become carriers of the disease and serve as a source of infection for other animals in the same herd, newborns, and other populations through natural movements, forays, or translocations (*Sells 2015, Cassirer 2013, Besser 2012b*).

The complete range of mechanisms and/or causal agents that lead to disease events and low recruitment in bighorn sheep is still debated, and not all bighorn sheep disease events can be attributed to contact with domestic sheep or goats (*Sells 2015, Drew 2014, Shannon et al. 2014, MOU 2013, Besser 2012b, Wehausen 2011, George 2009, Aune 1998, Onderka 1984*). However, when contact between bighorn sheep and domestic sheep or goats has been documented the severity of the bighorn sheep die-off is typically more pronounced (*Aune 1998, Martin 1996*).

The preponderance of scientific literature supports the potential for respiratory diseases to be transmitted from domestic sheep and goats to bighorn sheep (*Carpenter 2014, Lawrence 2010*), frequently followed by bighorn mortality events (*Sells 2015, Cassirer e2013, Drew 2014, Besser 2012a, b, c, and 2012d, WAFWA 2012, USDA Forest Service 2011b, Wehausen 2011, USDA Forest Service 2010a, CAST 2008, Schommer 2001, Martin 1996*). It is recognized that opposing arguments question this science and dispute the connection.

Research continues on the science of disease transmission, bighorn mortality events, and the potential for development of effective vaccines (*TWS 2015, Besser 2013, Miller 2011, Srikumaran 2011, Subramaniam 2011, Wehausen 2011*). But until the science is better understood and/or

effective vaccines are developed, many organizations and researchers recommend it is prudent to consider and implement management actions designed to keep the species separate to prevent disease transmission and subsequent bighorn mortality events *(TWS 2015, MOU 2013, WAFWA 2012, ASIA 2011, Cahn 2011, USDA Forest Service 2011b, George 2009, USAHA Joint Working Group 2009, CAST 2008, Beecham 2007, Schommer 2001*).

There are several key factors within the environment that may contribute to the potential for physical contact between domestic and bighorn sheep. Overlap of the bighorn's habitat with the areas grazed by domestic sheep is one of these key factors. Within the Weminuche Landscape, areas suitable for grazing by domestic sheep on two active domestic sheep allotments (Canyon Creek and Tank Creek), and portions of four vacant sheep allotments (Cave Basin, Flint Creek, Pine River and Rock Creek) overlap with Core Herd Home Range (CHHR) for bighorn sheep. Additional source (suitable) habitat for bighorn sheep extends across other areas of these allotments, suggesting that bighorn sheep could travel or disperse (i.e. foray) across currently vacant but suitable source habitats, creating a potential risk of physical contact between bighorn and domestic sheep. The risk of physical contact between foraying bighorn sheep and domestic sheep corresponds to many factors, including:

- the number of bighorn sheep in a herd,
- the proximity of domestic sheep allotments and bighorn CHHR's,
- the distribution of suitable sheep grazing areas within an active allotment,
- the distribution of bighorn sheep source habitats (suitable habitat) across the landscape, and
- the distance and frequency of bighorn sheep forays outside their CHHR.

The bighorn sheep CHHRs referred to throughout this document are the 2013 summer range maps provided by CPW. CPW maps the summer range of bighorn sheep herds as that part of their overall range where 90% of individual bighorn sheep are located between spring green-up and the first heavy snowfall. Summer range does not necessarily include all bighorn occurrences during the summer season because small numbers (< 10%) of bighorn sheep may occur outside the mapped summer range. In addition, small numbers of bighorn sheep rams and ewes may leave their CHHR during summer and disperse (i.e. foray). For these reasons it is important to consider the proximity of bighorn CHHR, as well as the amount and juxtaposition of suitable bighorn summer source habitats in relation to active domestic sheep allotments and driveways when considering the potential for interaction between the species. Summer source habitat is defined as all habitat that is physically suitable for bighorn use, but is not necessarily occupied; in this landscape it covers a greater acreage than CHHR.

Table 3-5 shows the overlap of bighorn sheep habitats and domestic sheep areas, calculated in two different ways. Firstly, the table compares the acreage of overlap between bighorn summer source habitat with suitable grazing acres for domestic sheep, or the areas where the two species would be most likely to come into contact. The higher the amount of overlap, the greater the chances the two species could come into contact. The table shows difference in this overlap for all alternatives.

Secondly, Table 3-5 shows the overlap of CHHR with allotments (for Alternative 2 only because the other alternatives remove all overlap). This measure is important because CHHR reflects the known occupied locations of bighorn, as opposed to all habitat that might be suitable for them.

Table 3-5. Acres of Overlap - Bighorn Habitats and Domestic Sheep Areas.

	Acres Overlap Between Bighorn Summer Source Habitat and Suitable Sheep Grazing Range in Open Allots. ++				Acres Overlap Between Bighorn CHHR and Open Allotments++
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 2 only
Burnt Timber Allotment	n/a	788	788	788	0
Canyon Creek Allotment	n/a	178	172	172	1,101
Cave Basin Allotment	n/a	1849	Closed	0 *	19,575
Endlich Mesa Allotment	n/a	1937	1937	1937	0
Fall Creek Allotment	n/a	620	Closed	0 *	0
Flint Creek Allotment	n/a	1408	Closed	0 *	9008
Johnson Creek Allotment	n/a	544	455	0 *	0
Leviathan Allotment	n/a	241	241	0 *	0
Pine River Allotment	n/a	4340	Closed	0 *	14,184
Rock Creek Allotment	n/a	2053	1563	0 *	829
Spring Gulch Allotment	n/a	89	89	89	0
Tank Creek Allotment	n/a	2637	2872	2872	1,356
Virginia Gulch Allotment	n/a	3994	4008	4008	0
Total Acres Overlap in Landscape	n/a	20,680	12,125	9,866	46,053

++Open Allotment = Active, Vacant, or Forage Reserve, but not Vacant with Restocking Requirements
* Considered as zero acres because restocking would not occur without meeting requirements and further NEPA

Details about the configuration of various types of bighorn habitat and suitable domestic sheep range within the allotments, the proximity to CHHR, and the known history of use of the allotments by domestic livestock are given in the project record (*Schultz 2015b, Whitmer 2011*).

Known reports and records of use by bighorns are briefly summarized here:

Burnt Timber Allotment
Bighorn sheep have not been reported in the allotment during the summer grazing season.

Canyon Creek Allotment
Bighorn sheep have not been reported in the allotment during the summer grazing season.

Cave Basin Allotment
Bighorn sheep are regularly observed in eastern and northern portions of the allotment during summer. Bighorns have been documented in the area since at least the 1940s.

There was strong circumstantial evidence of physical contact between transplanted bighorns and domestic sheep grazed in the allotment in 1988, and strong evidence that this contact resulted in a

presumed complete mortality event of the released bighorns before their first winter. Disease did not appear to have been transmitted from the transplanted bighorns to the native bighorn herd because population size and lamb survival remained stable in the native bighorn herd after the event (*Weinmeister 2012*).

Endlich Mesa Allotment
A reliable report of bighorn sheep seen within ¼ mile of domestic sheep occurred in late summer of the 2012 or 2013 grazing season. This report confirms the presence of foraying bighorns within the allotment and in close proximity to domestic sheep.

Fall Creek Allotment
Bighorn sheep were reported in the allotment in 1954 (*USDA 1954*). Recently, they have not been reported within the allotment during the summer grazing season and no reports have been received of bighorn observations along the portion of the Vallecito Creek Trail leading to the allotment.

Flint Creek Allotment
Bighorn sheep are regularly observed in western, northern and southeastern portions of the allotment during summer. Bighorns have been documented in the area since at least the 1940s. There is consensus that within the past 20 years bighorn use areas have likely expanded slightly in the southeast portion of the allotment.

Johnson Creek Allotment
Bighorn sheep were reported in vicinity of the allotment in 1954 (*USDA 1954*). Recently, they have not been reported within the allotment during the summer grazing season and no reports of have been received of bighorn observations along the portion of the Vallecito Creek Trail that is within or near the allotment, or along the Johnson Creek Trail.

Leviathan Allotment
Bighorn sheep were reported in the allotment in 1954 (*USDA 1954*). Recently, they have not been reported within the allotment during the summer grazing season and no reports of have been received of bighorn observations along the portion of the Vallecito Creek Trail that is within or near the allotment.

Pine River Allotment
Bighorn sheep are known to use portions of the allotment during spring, summer and fall, and for lambing. Bighorns have been documented in the area since at least the 1940s and continue to be documented in the area every summer.

Rock Creek Allotment
Bighorn sheep are known to use portions of the allotment during summer. Bighorns have been documented in the area since at least the 1940s and were reported in the vicinity of the allotment in 1954 (*USDA 1954*). Reduced use in the Rocky Benches and Hunchback portions of the allotment was suggested in 1969 to protect the area for bighorn sheep. Bighorn sheep have not been reported during the summer grazing season within that portion of the allotment proposed to remain open as a forage reserve allotment. No reports have been received of bighorn observations along the portion of the Vallecito Creek Trail that is within or near the allotment, including along the lower Rock Creek Trail.

Spring Gulch Allotment
Bighorn sheep have not been reported in or near the allotment during the summer grazing season.

Tank Creek Allotment
Bighorn sheep have not been reported in the allotment during the summer grazing season.

Virginia Gulch Allotment
A reliable report of "2 nice rams" seen within ½ mile of domestic sheep occurred in mid-summer of the 2014 grazing season. This report confirms the presence of foraying bighorns within the allotment and in close proximity to domestic sheep.

Weminuche Landscape intersects the CHHR of three bighorn sheep herds, with each herd representing a Game Management Unit. The three herds with CHHR intersecting the Weminuche Landscape include: S-16, the Cimarrona Peak Herd, S-28, the Vallecito Creek Herd, and S-71, the West Needles Herd. Under current conditions, there is about 2,457 acres of mapped overlap with the CHHR for the West Needles Herd S-71 in the Canyon Creek and Tank Creek Allotments. There is about 39,516 acres of mapped overlap with the CHHR for the Vallecito Creek Herd S-28 in the Cave Basin, Flint Creek, Pine River and Rock Creek Allotments. There is about 4,080 acres of mapped overlap with the CHHR for the Cimarrona Peak Herd S-16 in the Pine River Allotment.

The S-16, Cimarrona Peak, and S-28, Vallecito Creek bighorn herds are considered by CPW to represent one large interconnected meta-population, along with S-15, the Sheep Mountain herd, to the east. Together, these three herds comprise the Weminuche Population Data Analysis Unit. The current estimate for the Weminuche Population is 425 bighorn sheep, which includes 200 sheep in S-15, 135 sheep in S-16, and 90 sheep in S-28 (*Weinmeister 2012*). The current population objective for the Weminuche Population is to allow the population to expand to a maximum of 4.4 bighorn sheep/square kilometer. The 2010 population estimate for the Weminuche Population Data Analysis Unit was 2.2 bighorn sheep/square kilometer (*Weinmeister 2012*), well below the population objective of 4.4 sheep/square kilometer.

There is no mapped overlap between domestic sheep allotments in the Weminuche Landscape and mapped summer range for S-15, although the Weminuche Population is considered to be an interconnected meta-population. Because the three herds are considered to be an interconnected meta-population with regular biological interactions, it is likely that decisions regarding domestic sheep grazing in the Weminuche Landscape could have effects to the S-15 Sheep Mountain Herd through its biological connections with S-16 and S-28. The level of risk to S-15 through exchange of individual bighorns across the larger meta-population is thought to be lower than the risk of domestic sheep grazing in close proximity to S-16 and S-28. Domestic sheep grazing in proximity to S-15 are managed by the Pagosa Ranger District of the SJNF, and by the Divide Ranger District of the Rio Grande National Forest.

The Weminuche Population is one of the largest indigenous bighorn sheep populations in the state. A management plan was developed for this population (*Weinmeister 2012*), and it is a Tier 1 population. Tier 1 populations are regarded as those large, native populations comprised of one or more interconnected herds that have received few, if any supplemental releases of bighorn sheep in the past. These populations likely represent those indigenous bighorn populations that have maintained the greatest genetic diversity, and their ranges represent habitats where bighorns have been best able to persist in sizeable numbers despite various adversities (*George 2009*). As such, CPW considers the Weminuche Population to be among the most important bighorn herds in the state, which places the population in the top priority State-wide for inventory and monitoring, habitat protection and improvement, disease prevention, and research.

There is some recent concern for the population status of the S-28 Vallecito Creek Herd due to the recent (since 2012) decline in the estimated total population size of the herd. This concern is also due to eight mature rams having been found dead between 2010 and 2014 and the cause of death remains unknown (*Weinmeister pers. comm.*). Recent CPW monitoring data indicates lamb production has remained stable during this same time. Why a high number of mature rams have been found dead in S-28, yet lamb production appears to remain stable and normal, is unknown but it is not consistent with mortality patterns associated with a disease event. A contributing factor may be the remote nature of this Weminuche Population and the core herd areas within it, making monitoring activities and animal detections from aircraft difficult.

The current S-71 West Needles Herd was established with animals translocated from the Georgetown Herd in 2000, and 2002-2003 (*Beecham 2007*). Bighorn sheep now appear to use the entire Animas River Canyon from Rockwood northeast to Needle Creek, and perhaps somewhat further north particularly on the west side. The primary summer range of this herd is the West Needle Mountains, and primary winter and lambing range is the Animas River Canyon from Rockwood to the Cascade Wye (*Beecham 2007*), along with more recent evidence of lambing at higher elevations in the West Needle Mountains (*Weinmeister pers. comm.*). Recent observations (summer 2012 through 2015) show increased bighorn use along U.S. Highway 550 near Coal Bank Pass, west of the West Needle Mountains, indicating the herd may be expanding its range to the west and north.

The total population of the S-71 West Needles Herd is estimated at about 60 animals. Because S-71 is a translocated herd it is considered by CPW to be an "unclassified" herd (*George 2009*). As an unclassified herd, S-71 is placed at a lower priority for inventorying, habitat protection and improvement, and research, as compared to populations that are considered primary core populations or Tier 1 and 2 populations. Also, as a translocated population, CPW recognizes the presence of pre-existing active domestic sheep grazing allotments to the north, east, and west of S-71. CPW does not advocate closure of pre-existing active domestic sheep allotments based solely on the potential for interaction between domestic and bighorn sheep originating from translocated herds (*MOU 2013*). All of the currently active domestic sheep allotments in the Weminuche Landscape were active long prior to the establishment of the S-71 herd by CPW translocations.

A Risk Assessment was conducted that focused on the relative potential for risk of physical contact between bighorn and domestic sheep, in relation to the selection of one action alternative over another. The assumption was made, based on scientific evidence that physical contact between bighorn sheep and domestic sheep results in an increased *risk* of disease transmission to bighorn sheep, with increased *potential* for a subsequent bighorn mortality event.

As part of the analysis process, the Risk of Contact Tool, prepared by the USDA Forest Service Bighorn Sheep Working Group (*USDA 2013*), was used to help evaluate bighorn sheep movements (i.e. forays) outside their CHHR, and assess the potential for risk of contact between bighorn sheep and domestic sheep allotments in the Weminuche Landscape. It should be noted that the risk of contact tool provides an estimate for the frequency that a foraying or wandering bighorn sheep may cross into an active allotment; it does *not* provide an estimate for the rate of physical contact between animals of the two species, or for the rate of disease transmission.

The Risk Assessment process followed a four-step approach to risk assessment and viability analysis outlined in a letter by the Deputy Chief of the Forest Service (*USDA 2011b, 2012b*). This

process directed field units to conduct qualitative, and where possible, quantitative analyses of the potential for interaction between domestic and bighorn sheep when the agency is making decisions requiring National Environmental Policy Act (NEPA) analysis regarding livestock grazing activities. The guidance provided in the Forest Plan is to prevent physical contact between domestic and bighorn sheep, thereby minimizing the potential for disease transmission and a subsequent mortality event of bighorn sheep.

The Risk Assessment was conducted to analyze the potential impacts to native Rocky Mountain bighorn sheep of grazing domestic sheep under each of the project's three action alternatives. Findings of the Risk Assessment are summarized in the *Environmental Consequences, Rocky Mountain Bighorn Sheep* section below. The full Risk Assessment is included in the project record (*Schultz 2015e*).

White-Tailed Ptarmigan

White-tailed ptarmigan are endemic to alpine habitats of western North America, primarily at or above treeline. They also use riparian zones, meadows and willow carrs near treeline in the subalpine zone. In the Rocky Mountains, ptarmigan have a highly disjunct distribution, occurring at the highest elevations of mountain ranges that are often widely separated from adjacent ranges. Colorado supports the largest population of ptarmigan and greatest expanse of suitable habitat in the United States outside of Alaska (*Hoffman 2006*). Ptarmigan are legally hunted in Colorado, and some easily accessible ptarmigan populations may be vulnerable to over-harvest due to their unwary behavior and their habit of concentrating in large flocks in traditional use areas.

Individual adult ptarmigan have high site fidelity to preferred breeding and wintering areas. The single most important feature of habitats used by ptarmigan in Colorado is willow (*Salix spp*.), which is their primary food source from late fall through spring. Any activity that reduces the distribution and abundance of willow will likely have negative consequences to ptarmigan (*Hoffman 2006*). In winter, willows growing on exposed ridge tops are usually less than three feet tall and are rarely covered by snow. These areas are consistently used as feeding sites by ptarmigan throughout the winter. Rangeland monitoring in the Weminuche Landscape showed these areas are also consistently used by domestic sheep throughout their permitted grazing season.

Most preferred winter areas are at or near timberline in basins near the heads of drainages, meadows, and other areas of relatively gentle terrain at or near timberline. These same areas are also preferred grazing areas by domestic sheep in mid-summer. For these reasons, there is direct overlap between ptarmigan winter feeding and roosting areas and domestic sheep grazing areas. Eggs hatch from late June to early August, peaking in mid-July at about the same time that domestic sheep are turned on to allotments in the Weminuche Landscape. Ptarmigan brood rearing is late July through late September, overlapping with most of the domestic sheep grazing season. One Colorado study indicated that ptarmigan use of summer habitats may be influenced by the presence and intensity of domestic sheep grazing (*Braun 1971*).

There is likely to be substantial forage overlap between ptarmigan and domestic sheep in some areas and during some seasons. Elk are also potential forage competitors with ptarmigan, and elk populations have increased dramatically over the past 50 years in Colorado and in the Weminuche Landscape. In the Weminuche Landscape, the only forage available to elk wintering in alpine areas is willow on windswept ridgelines, the same areas preferred by ptarmigan in winter. Substantial browsing on upland willow communities was observed in many allotments, although the effects

were usually restricted to localized areas. It was often difficult to determine with certainty whether domestic sheep or elk, or a combination of both, were primarily responsible.

Ptarmigan populations in the southwest Colorado ore belt, roughly between Telluride, Silverton and Lake City are thought to not be self-sustaining. Research by Larison et al. (*2000*) demonstrates that reduced over-winter survivorship of adult female ptarmigan caused by cadmium-induced renal failure and brittle bones is limiting ptarmigan breeding densities and productivity in this area. Cadmium naturally occurs in high concentrations in the Colorado ore belt and is readily mobilized by mining. Cadmium is taken up by willows and biomagnified in the buds which are the primary winter food source for ptarmigan (*Hoffman 2006*). Larison et al. (*2000*) found adult female survivorship in the southwest Colorado ore belt was reduced by more than half causing highly skewed sex ratios and low productivity. They also documented high rates of immigration (from nearby less contaminated populations) and the lowest breeding densities of any ptarmigan population throughout the species' range.

Because ptarmigan populations in this area may not be self-sustaining, protecting and maintaining winter habitat for adult female ptarmigan is likely to be a key factor in ensuring long-term population persistence in the Colorado Ore Belt and in the Weminuche Landscape. Maintenance and protection of winter habitat is especially important given the high site fidelity of wintering birds and the considerable numbers of adult females that are attracted from surrounding breeding habitats to the few suitable wintering sites (*Braun 1976*). Ptarmigan populations may be especially vulnerable to loss or degradation of winter habitat given that population densities are much lower than other areas and may not be self-sustaining (*Larison 2000*).

Environmental Consequences

North American Wolverine

Alternative 1: No Term Livestock Grazing

Selecting Alternative 1 would be entirely beneficial to wolverine. Under Alternative 1, all wolverine habitats in the landscape would be protected from impacts associated with domestic livestock grazing. Improvement in alpine habitats would be limited to those areas where domestic sheep grazing was the primary browsing agent. Improvement in alpine habitat conditions under Alternative 1 would likely occur slowly over time because of the relatively short growing seasons in the alpine zone. The relatively small number of domestic sheep currently permitted to graze in the Weminuche Landscape (about 4,400), compared to decades past (about 11,500 in the 1940's), also suggests that the rate of improvement in alpine habitat conditions is likely to be less today than in decades past when domestic sheep numbers declined much more rapidly.

Alternative 2: Current Management

Selecting Alternative 2 would be neutral for wolverine due to the relatively low numbers of domestic sheep, compared to past decades, and grazing would likely continue on the landscape for the foreseeable future. Selecting Alternative 2 would be much less beneficial than selecting Alternative 1. Under Alternative 2, about one third (33%) of alpine habitats in the landscape would continue to be affected by domestic sheep grazing. Under Alternative 2, conditions of alpine habitats would continue to be impacted by livestock grazing in localized areas causing continued degraded habitat conditions in these localized areas. A continued gradual improvement in alpine habitat conditions would be expected under Alternative 2 even if numbers of domestic sheep

remained relatively stable over the next few (5+) years. This is because at current sheep stocking levels, the observed gradual improvement in alpine plant communities across most allotments is expected to continue over the short term.

Alternative 3: Adaptive Management /Forage Reserves

Selecting Alternative 3 would be generally beneficial for wolverine, although less so than selecting Alternative 1, but more so than selecting Alternative 2. Benefits to wolverine from selecting Alternative 3 would likely be limited to the localized areas where current sheep grazing practices are degrading alpine habitats. Compared to Alternative 2, selecting Alternative 3 would have beneficial effects for wolverine because application of adaptive management strategies and Design Criteria are expected to result in more rapid improvements in alpine habitat conditions in the areas where sheep grazing is affecting those conditions. Benefits to wolverine from selecting Alternative 3 would probably occur over a longer time frame than under Alternative 1, but a shorter time frame than under Alternative 2. This is due to the application of adaptive management strategies and Design Criteria under Alternative 3 that would not occur under Alternative 2.

Selecting Alternative 3 would result in a 12% reduction in the amount of alpine habitats where there would be potential for livestock grazing impacts, compared to Alternative 2. Selecting Alternative 3 would be more beneficial to wolverine than selecting Alternative 2 because four vacant sheep allotments (Cave Basin, Fall Creek, Flint Creek and Pine River) that could be restocked under Alternative 2 would be closed to sheep grazing under Alternative 3. Also, portions of two other allotments (Johnson Creek and Rock Creek) that could be restocked under Alternative 2 would be closed to sheep grazing under Alternative 3. In addition, under Alternative 3, the three sheep forage reserve allotments (Leviathan and portions of Johnson Creek and Rock Creek) could be restocked only up to three years out of any ten consecutive years, compared to the potential for annual stocking under Alternative 2. For this reason, if the allotments were stocked as forage reserves under Alternative 3 the potential impacts to alpine habitats from sheep grazing would be less than under the potential for grazing impacts that could occur if the allotments were stocked every year under Alternative 2.

Selecting Alternative 3 would reduce the potential for sheep grazing activities to disturb individual wolverines, especially denning females, compared to Alternative 2. The potential for disturbance would be somewhat reduced (by about 15%) by selecting Alternative 3 versus Alternative 2.

Selecting Alternative 3 would be less beneficial than selecting Alternative 1 because the localized areas currently degraded by sheep grazing would continue to be affected, such as near the alpine/spruce-fir interface, moist alpine areas adjacent to riparian zones or wet meadows, and upland willow stands in alpine basins. Although more rapid improvement in alpine habitat conditions is expected under Alternative 3 than under Alternative 2, improvements in habitat conditions due to adopting the adaptive management approach are likely to be too small to affect the total amount of habitat available in the Weminuche Landscape.

Alternative 4: Adaptive Management / Vacant Allotments with Restocking Requirements

Selecting Alternative 4 would be generally beneficial for wolverine, more so than selecting Alternative 3, and much more so than selecting Alternative 2. However, selecting Alternative 4 would be less beneficial than selecting Alternative 1. Benefits to wolverine for selecting Alternative 4 would be greater than for selecting Alternative 3 because the three sheep forage

reserve allotments proposed under Alternative 3 would not authorized, and the vacant allotments would not be re-stocked without meeting the specific restocking requirements under Alternative 4, including more NEPA analysis. Selecting Alternative 4 would result in a 3% reduction in the amount of alpine habitats where there would be potential for sheep grazing impacts, compared to Alternative 3, and an 18% reduction compared to Alternative 2.

Benefits to wolverine from selecting Alternative 4 are likely to be limited to the localized areas in the currently active allotments where sheep grazing practices have degraded alpine habitats. Selecting Alternative 4 would have some beneficial effects because application of adaptive management strategies and Design Criteria should result in more rapid improvements in alpine habitat conditions in the areas where sheep grazing is currently affecting those conditions. Benefits to alpine habitats from selecting Alternative 4 would probably occur over a longer time frame than under Alternative 1, but a shorter time frame than under Alternative 2 due to application of adaptive management strategies and project Design Criteria.

Selecting Alternative 4 would be less beneficial than selecting Alternative 1 because the localized areas currently affected by sheep grazing activities in active allotments would continue to be affected, such as near the alpine/spruce-fir interface, moist alpine areas adjacent to riparian zones or wet meadows, and upland willow stands in alpine basins. Although more rapid improvement in alpine habitat conditions is expected under Alternative 4 than under Alternatives 3 and 2, improvements in habitat conditions due to adopting the adaptive management approach are likely to be too small to affect the total amount of habitat available in the Weminuche Landscape.

The Weminuche Landscape is located adjacent to a region that is documented as providing an important connectivity area for forest carnivores (e.g. lynx) moving east/west through the central San Juan Mountains. Given the landscape's location in relation to high use connectivity habitat areas, its recognized high potential for sustaining wolverines and the remote nature of most of the landscape especially during the most sensitive time period of wolverine ecology (denning and early kit rearing), the landscape is likely to be important to wolverine movement and regional connectivity, if any animals were present.

Selecting any of the action alternatives (Alternatives 2, 3 or 4) could impact individual wolverines, if they were to occur in the San Juan N.F. Selecting any of the action alternatives would not cause a loss of viability on the planning area (the entire SJNF) because they are not known to exist on the SJNF. Because wolverine is believed to have been extirpated from the southern Rocky Mountains, including the state of Colorado *(Aubry 2007, Copeland 2010, USDI 2013b*), selecting any of the action alternatives would not cause a trend toward federal listing or loss of species viability rangewide.

Determination

For the reasons stated in this analysis it was determined that Alternatives 2, 3 or 4 "**may adversely impact individual North American wolverines but is not likely to result in a loss of viability in the planning area nor cause a trend toward federal listing, or loss of species viability rangewide.**"

Rocky Mountain Bighorn Sheep

There has been a significant amount of work done to analyze the level of risk that continued domestic sheep grazing may pose to bighorn sheep. This work includes a review of the available literature as well as the preparation of Biological Evaluation (BE) and a Risk Assessment (RA). This EIS draws on these documents as well as key lines of information to provide the reader with an assessment of the potential impacts based on the best available science. This section will first provide a summary of the key lines of information, including the Risk Assessment, and then discuss each alternative within the context of these key lines of information.

The key lines of information are:

- Historic data of domestic sheep grazing and bighorn sheep,
- Permittee reports of bighorn sheep sightings,
- CPW opinions on the risk to bighorn sheep from continued domestic sheep grazing,
- Effectiveness of Design Criteria (BMPs) in preventing contact,
- The Risk Assessment document and risk of contact computer model.

Historic Data

Domestic sheep grazing began well over 100 years ago on this landscape, with unregulated grazing initially occurring on a "first-come, first-served" basis. In the early 1900's with the formation of the San Juan National Forest, grazing became regulated with ranchers receiving grazing allotments or parcels where they were allowed to graze on the National Forest with limits on the grazing season and the number of animals allowed to be grazed. When the San Juan National Forest was established in 1905, it was made up of what is now the Columbine and Pagosa Ranger Districts. Initially, about 109,000 sheep and goats were authorized to graze on this landscape. During the 1930's, about 216,000 sheep and goats were authorized on this landscape. This represented the peak of domestic sheep grazing, with numbers gradually decreasing until about the 1980's. Domestic sheep grazing occurred over all the allotments, and given the intensity of grazing, ranchers likely utilized all suitable grazing lands and even a fair proportion of marginal land. Active grazing occurred within occupied bighorn sheep habitat for decades. From the 1930's to the 1980's domestic sheep grazing steadily declined, leaving only two families grazing sheep in the Weminuche Landscape in the 1980's. Since the 1980's, only six allotments have been actively grazed, with about 4,400 domestic sheep, or roughly 5% of the historic high. The present grazing pattern has been in place for the past 30 years.

Throughout this time, bighorn sheep have persisted on the landscape. While their numbers have not been accurately monitored during the entire period of domestic sheep grazing, it is safe to say that a sufficient number of bighorns persisted and were able to either re-establish viable herds, or viable herds persisted on the landscape throughout the entire period in question. The long-term persistence of bighorn sheep on this landscape is a critical line of data that speaks directly to the viability of bighorn sheep and their compatibility with domestic sheep grazing on this landscape.

Permittee Reports

Grazing permittees told Forest Service employees that they have not seen bighorn sheep on their allotments for over 30 years. Considering a 100-day grazing season, this amounts to about 3,000 days of on-the-ground monitoring over 30 years, which is a larger dataset than either the Forest

Service or CPW has from their own monitoring efforts. The herders were interviewed and they acknowledged occasional sightings of bighorns, but due to language barriers, no more specifics were able to be gleaned from these interviews (*Madrid 2015*). It is assumed that bighorns do not come near the domestic sheep because the herders are equipped with SPOT units, and will notify the FS if a bighorn comes near the domestic sheep bands. The herders have never activated their SPOT units to notify the Forest Service of the presence of bighorns.

CPW Position

This line of information is considered because the CPW biologists are probably the most familiar with the current state of bighorn herds on this landscape, and the risks to those herds. The CPW and CO Department of Agriculture were supportive of an alternative that continues to allow domestic sheep grazing on the Weminuche Landscape in a manner that reduces the risk of contact. They expressed concern about the proximity of domestic sheep grazing on this landscape, and they also expressed that grazing under current conditions posed a low enough risk that grazing could continue. The State also expressed concerns about closing allotments to grazing, and the potential for future limitations on grazing and impacts to the local agricultural economy and community (*Broscheid and Salazar 2014*).

Design Criteria Effectiveness

Design Criteria (or BMPs) are actions and tools used to prevent contact and/or increase separation between domestic sheep and bighorns. They range from the obvious actions like hazing or chasing off bighorns that may wander close to the domestic sheep, to the less obvious actions like frequent counting of domestic sheep to make sure the number of strays are reduced. The Design Criteria are described in Chapter 2, Tables 2-3 through 2-5. Nearly all the Design Criteria aimed at preventing contact came from a working group made up of wildlife agencies' and Federal land management agencies' representatives (*WAFWA 2012*). The parties involved in creating the Design Criteria (called BMPs in the guidelines) have experience in bighorn sheep management and open range grazing, which is why these Design Criteria can be accepted as state-of-the-science, or best available science, for preventing contact between the two species. While the authors of the WAFWA guidelines admit there are no conclusive scientific studies designed to quantify risk reduction for each Design Criteria, or any combination of Design Criteria, the historic data can be relied upon to some degree for an assessment of Design Criteria effectiveness. On the Weminuche Landscape and the adjoining Silverton Landscape, Design Criteria have been in use for several decades, and each year they are reviewed with the permittees, and if new Design Criteria are identified, they are adopted and implemented. Continued use of Design Criteria, and adoption of new Design Criteria as they are identified, should continue to reduce the risk of contact.

Risk Assessment and Risk of Contact Tool Computer Model

The Risk Assessment relies largely on the risk of contact tool computer model to assess the risk of contact between bighorn sheep and domestic sheep. The computer model predicts the frequency that foraying bighorns will contact an active allotment. The allotment contact rates portrayed in the Risk Assessment were then factored into an overall risk ranking (High, Moderate, or Low) for each allotment. There are some potentially confusing aspects of the computer model and the Risk Assessment's portrayal of disease return intervals, which is why the risk rankings from the Risk Assessment are considered, but not repeated in this EIS.

The historic data show bighorn sheep have persisted on this landscape for well over a century despite the fact that approximately three times more domestic sheep were grazed compared to the current grazing scenario. During the 30-year period of current grazing conditions, bighorn populations have increased on the landscape with no evidence of die-off; this trend has stabilized in about the last seven years.

Alternative 1: No Term Livestock Grazing

Because no domestic sheep grazing would be authorized, this alternative represents the least risk of contact with bighorns when compared to the other alternatives. While there remains some risk to bighorns from pack goats, domestic sheep grazed on adjacent lands (BLM, adjacent Forests, and private), and possibly from the mountain goats in the Needle Creek drainage, the overall risk to bighorns would be substantially reduced with this alternative.

Alternative 2: Current Management

If current management were carried forward, domestic sheep grazing could be authorized on all 13 allotments instead of just the six currently active allotments. If any of the seven vacant allotments were permitted and stocked, the risk to bighorn sheep would escalate because the domestic sheep would be grazing in occupied bighorn habitat or in very close proximity to occupied habitat, and the probability of contact and disease transmission would increase.

While the historic data show the seven vacant allotments were intensively grazed in the past, there is insufficient historic data on bighorn populations through the period of intense grazing to conclude they were viable or thriving populations. The historic data on bighorns indicate a reduction in reported sightings through time, but with no direct tie to disease transmission from domestic sheep. Regardless, given the science that shows contact between the two species may lead to disease transmission, one must conclude that stocking these vacant allotments would lead to increase probabilities of disease transmission and bighorn die-offs.

Design Criteria have been shown to reduce the overall risk of contact through the successful grazing of domestic sheep over the past 30 years on this landscape and the expansion of bighorns during this time, but the lack of quantitative data associated with implementation of Design Criteria means that Design Criteria cannot be relied on solely to mitigate the risks arising from stocking any of the vacant allotments (*WAFWA 2012*).

There is insufficient data to compare the permittee bighorn sightings in the active allotments with bighorn sightings in the vacant allotments. This is simply because the permittee is spending all their time within the active allotments, and no time in the seven vacant allotments. Therefore, this line of information cannot be used to assess risk should the vacant allotments be stocked. Similarly, the State of Colorado in their official comment letter on the Draft EA, did not specifically address Alternative 2 other than to say closure of vacant allotments would reduce the risk of contact (*Broscheid and Salazar 2014*).

When all lines of information are considered, this alternative represents the greatest risk of contact between domestic and bighorn sheep.

Alternative 3: Adaptive Management /Forage Reserves

This alternative would create forage reserves on portions of some vacant allotments that do not have direct overlap with occupied bighorn range, and the portions of all vacant and active

allotments with direct overlap would be closed to domestic sheep grazing. In the case of Cave Basin and Canyon Creek, all or portions of these allotments could be converted to cattle grazing.

While this alternative seems complicated, assessing the relative risk of contact is fairly straightforward. There would be no domestic sheep grazing in the occupied bighorn habitat, and domestic sheep grazing on the forage reserves would be sporadic because grazing would be limited to three years in any ten year period, if needed. The exclusion of grazing in occupied bighorn habitat, coupled with only sporadic grazing in adjacent forage reserves, serves to reduce the risk of contact when compared to Alternative 2.

The historic data appears to support this alternative in that separation between the two species is maintained. However, the most recent bighorn data also shows increasing populations and expanding occupied range, particularly the West Needles herd. These trends in the recent historic data represent an increase in future risk to bighorn because the expansion of occupied habitat is likely to reduce the separation on the landscape.

CPW's goal is to increase the bighorn populations in this landscape. This is likely incompatible with an increase in the area grazed by domestic sheep. As the bighorn populations increase, it is difficult to predict what portions of the landscape they will occupy as summer range, but they could occupy portions of the forage reserve allotments and/or portions of the active allotments.

As with Alternative 2, Design Criteria have been shown to reduce the overall risk of contact but the lack of quantitative data associated with implementation of Design Criteria means that Design Criteria cannot be relied on solely to mitigate the risks arising from stocking the forage reserves.

There is insufficient data to compare the permittee bighorn sightings in the active allotments with bighorn sightings in the vacant allotments. This is simply because the permittee is spending all their time within the active allotments, and no time in the forage reserves. Therefore, this line of information cannot be used to assess risk should the forage reserves be stocked.

This alternative represents a lower risk of contact compared to Alternative 2, but a higher risk when compared to Alternatives 1 and 4.

Alternative 4: Adaptive Management / Vacant Allotments with Restocking Requirements

Alternative 4 has the lowest relative risk ranking of any of the grazing alternatives. Alternative 1, the No Grazing Alternative, has a lower relative risk, but it does not authorize any domestic sheep grazing. Like Alternative 3, no areas of direct overlap between bighorn CHHR and active domestic sheep allotments would remain in the Weminuche Landscape. Under Alternative 4, the three sheep forage reserve allotments proposed under Alternative 3 would be would not authorized. The seven vacant allotments would not be re-stocked without meeting the specific restocking requirements, including more NEPA analysis. The restocking requirements would make it difficult to re-authorize grazing a long as the current configuration of bighorn CHHR and populations exists. Figure 3-2 shows CHHR with adjusted allotment boundaries, illustrating that the allotment boundaries of all active allotments do not contain any CHHR.

Under Alternative 4, there is some remaining risk for physical contact between bighorn and domestic sheep in areas of overlapping bighorn sheep summer source habitat and domestic sheep suitable grazing range.

It is important to note that the areas of suitable domestic sheep grazing range proposed to be restricted by restocking requirements in this alternative are in vacant allotments, or in areas of the active allotments that have been rarely used. Fall Creek and the three forage reserve allotments have been vacant since 1968 or 1970. Flint Creek Allotment has been vacant since 1972, and the Pine River Allotment has been vacant since 1980. Furthermore, there have been no requests to stock these allotments since they became vacant.

Based on results of the Risk of Contact Tool, Alternative 4 provides substantially greater spatial and temporal separation between bighorn and domestic sheep than that provided under Alternatives 3 and 2. The allotment boundary adjustments and vacant allotment restocking requirements in Alternative 4 would substantially reduce the estimated rate of allotment contact by bighorns when compared to Alternatives 3 and 2.

The relative risk for physical contact between the species, and the area within the Weminuche Landscape where there is some potential for physical contact, decreases substantially from Alternative 2 to Alternative 3, and again substantially decreases from Alternative 3 to Alternative 4.

The historic data support this alternative as the least risk of any of the grazing alternatives analyzed. Over the past 30 years, grazing has occurred on the six active allotments while vacant allotments were not grazed. There have been no recorded cases of a disease-related die-off of bighorns during this timeframe in any of the nearby bighorn herds. Furthermore, the West Needles herd, introduced in 2000, has increased in size and expanded their range.

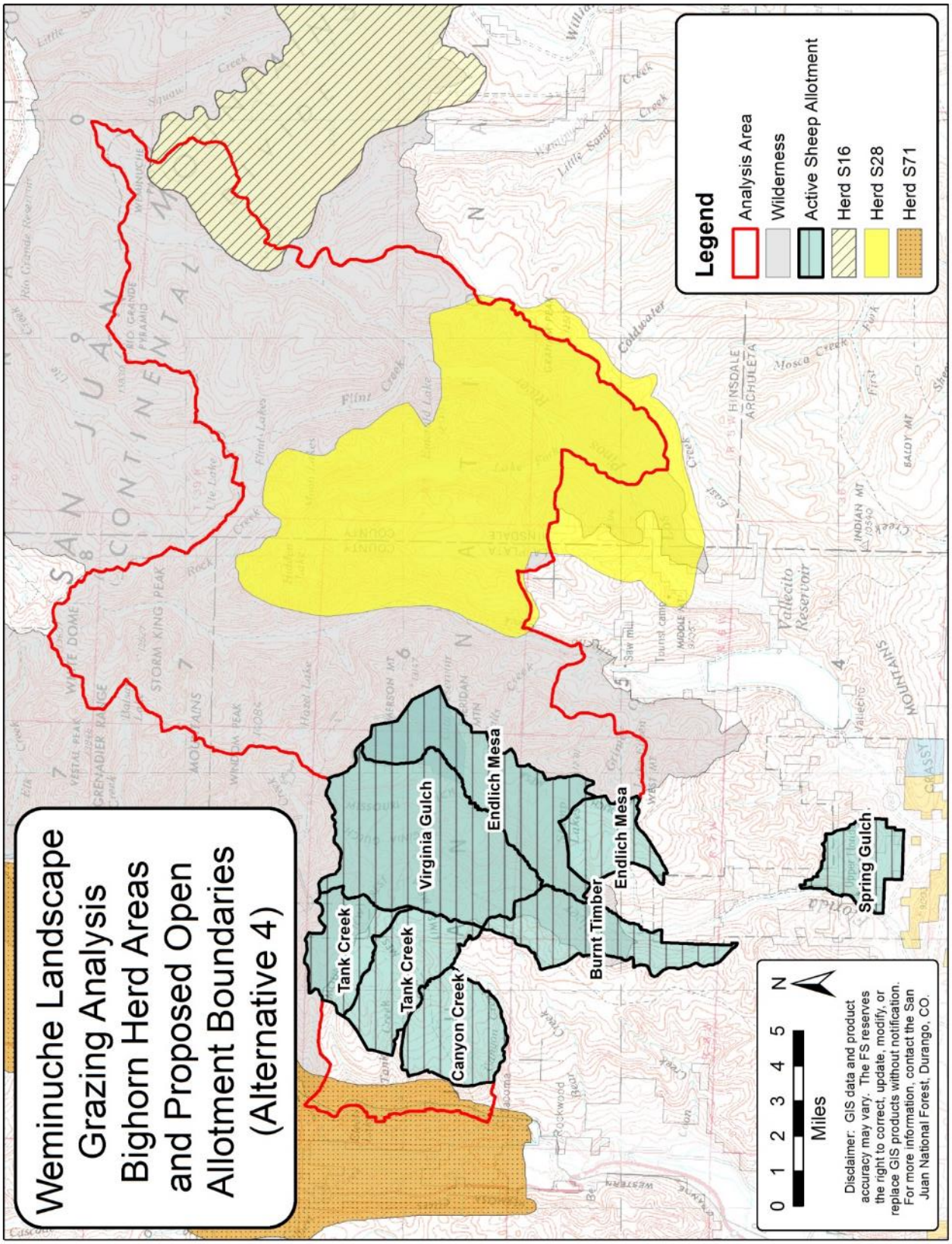
The permittee has not reported bighorns on the active allotments during the past 30 years, indicating a low rate of foraying bighorns coming in close proximity to the domestic sheep. This also points to a lower risk of contact than that predicted in the Risk Assessment within these active allotments.

The State of Colorado expressed support in continued grazing of these active allotments, and also expressed support in the continued implementation of Design Criteria that prevent contact. This line of information further supports the lower risk ranking of this alternative when compared to the others. However, the State has expressed some concern that the closure of the vacant allotments may not be commensurate with the risk associated with future grazing on these allotments (*Broscheid and Salazar 2014*).

Determination

For the reasons stated in this analysis it was determined that Alternative 2 "**may adversely impact individual Rocky Mountain bighorn sheep and is likely to result in a loss of viability on the planning area, in a trend to federal listing, or in a loss of species viability rangewide".** It was also determined that Alternatives 3 and 4 "**may adversely impact individual but is not likely to result in a loss of viability in the planning area nor cause a trend toward federal listing, or loss of species viability rangewide.**"

Figure 3-2. Bighorn Core Herd Home Range and Proposed Open Allotments



White-Tailed Ptarmigan

Alternative 1: No Term Livestock Grazing

Selecting Alternative 1 would be entirely beneficial to white-tailed ptarmigan. Alternative 1 would provide gradual improvement in the condition of summer and fall foraging areas, but these improvements would likely be limited in scope because upland willow stands where browsing impacts were observed were localized and not widespread. In addition, the improvement in upland willow condition would be limited to only those areas where domestic sheep grazing was the primary browsing agent. Those stands where elk browsing is also a factor might not show improvement over time in the absence of domestic sheep grazing. The improvement in summer foraging areas likely to occur under Alternative 1 would also likely occur slowly over time because of the relatively short growing seasons in the alpine zone. The relatively small number of domestic sheep currently permitted to graze in the Weminuche Landscape (about 4,400), compared to decades past (about 11,500 in the 1940's), also suggests that the rate of improvement in ptarmigan foraging habitats is likely to be less today than in decades past when domestic sheep numbers declined much more rapidly.

Alternative 2: Current Management

Selecting Alternative 2 would be neutral for ptarmigan due to the relatively low numbers of domestic sheep, compared to past decades, and grazing would likely continue on the landscape for the foreseeable future. Selecting Alternative 2 however, would be much less beneficial than selecting Alternative 1. Under Alternative 2 about 33% of ptarmigan habitat would be in areas suitable for domestic sheep grazing and thus potentially affected by impacts associated with domestic sheep grazing. Under Alternative 2, habitat conditions for ptarmigan would continue to be impacted in localized areas causing continued degraded habitat conditions in these localized areas. Under Alternative 2, improvement in ptarmigan habitat conditions would likely occur over a much longer time frame than under Alternative 1 because impacts associated with sheep grazing would continue. However, if the historic trend (1970's and 1980's) of declining numbers of domestic sheep permitted to graze in the landscape continued in the future, ptarmigan habitat conditions could be expected to gradually improve over time under Alternative 2. A continued gradual improvement in ptarmigan forage and cover conditions within summer and fall foraging areas would be expected under Alternative 2 even if numbers of domestic sheep remained relatively stable over the next few (5+) years. This is because at current sheep stocking levels, the observed gradual improvement in alpine plant communities across most allotments is expected to continue over the short term.

Alternative 3: Adaptive Management /Forage Reserves

Selecting Alternative 3 would be generally beneficial for ptarmigan, although less so than selecting Alternative 1, but more than selecting Alternative 2. Benefits to ptarmigan from selecting Alternative 3 would likely be limited to the localized areas where current sheep grazing practices are degrading summer and fall ptarmigan foraging areas. Compared to Alternative 2, selecting Alternative 3 would have beneficial effects for ptarmigan because application of adaptive management strategies and Design Criteria are expected to result in more rapid improvements in habitat conditions in the areas where sheep grazing is degrading ptarmigan habitat conditions.

Benefits to ptarmigan from selecting Alternative 3 would probably occur over a longer time frame than under Alternative 1, but a shorter time frame than under Alternative 2 due to application of

adaptive management strategies and Design Criteria. Selecting Alternative 3 would result in a 12% reduction in the amount of ptarmigan habitat, particularly summer and fall foraging areas, where there would be potential for livestock grazing impacts, compared to Alternative 2.

Selecting Alternative 3 would be less beneficial than selecting Alternative 1 because the localized areas currently degraded by sheep grazing would continue to be affected, such as near the alpine/spruce-fir interface, moist alpine areas adjacent to riparian zones or wet meadows, and upland willow stands in alpine basins. Although more rapid improvement in habitat conditions for ptarmigan is expected under Alternative 3 than under Alternative 2, improvements in habitat conditions due to adopting the adaptive management approach are likely to be too small to affect ptarmigan populations or the total amount of habitat available in the Weminuche Landscape.

Alternative 4: Adaptive Management / Vacant Allotments with Restocking Requirements

Selecting Alternative 4 would be generally beneficial for ptarmigan, more so than selecting Alternative 3, and much more so than selecting Alternative 2. However, selecting Alternative 4 would be less beneficial than selecting Alternative 1. Benefits to ptarmigan from selecting Alternative 4 are likely to be limited to the localized areas in the currently active allotments where sheep grazing practices have degraded summer and fall ptarmigan foraging areas. Selecting Alternative 4 would have some beneficial effects for ptarmigan that use these areas because application of adaptive management strategies and Design Criteria should result in more rapid improvements in habitat conditions in the areas where sheep grazing is currently affecting those conditions.

Selecting Alternative 4 would result in a 3% reduction in the amount of ptarmigan habitat where there would be potential for sheep grazing impacts, compared to Alternative 3, and a 18% reduction compared to Alternative 2.

Benefits to ptarmigan from selecting Alternative 4 would probably occur over a longer time frame than under Alternative 1, but a shorter time frame than under Alternative 2 due to application of adaptive management strategies and project Design Criteria. Within the active allotments, there would likely be little difference in ptarmigan habitat improvement between Alternative 4 and Alternative 3 because adaptive management strategies and Design Criteria would be applied in active allotments under both alternatives. However, Alternative 4 would provide greater benefits to ptarmigan habitat because the three forage reserve allotments authorized under Alternative 3 would not be authorized under Alternative 4, and restocking requirements for the vacant allotments would have to be met, including more NEPA analysis.

Selecting Alternative 4 would be less beneficial than selecting Alternative 1 because the localized areas currently degraded by sheep grazing activities in active allotments would continue to be affected, such as near the alpine/spruce-fir interface, moist alpine areas adjacent to riparian zones or wet meadows, and upland willow stands in alpine basins. Although more rapid improvement in habitat conditions for ptarmigan is expected under Alternative 4 than under Alternatives 3 and 2, improvements in habitat conditions due to adopting the adaptive management approach are likely to be too small to affect ptarmigan populations or the total amount of habitat available in the Weminuche Landscape.

Determination

For the reasons stated in this analysis it was determined that selecting Alternatives 2, 3 or 4 "**may adversely impact individual white-tailed ptarmigan but is not likely to result in a loss of viability in the planning area nor cause a trend toward federal listing, or loss of species viability rangewide.**"

Cumulative Impacts

Localized threats to alpine species, including ptarmigan and bighorn sheep and species such as wolverine with presumed sensitivities to some human activities, include mining, water development, and motorized and non-motorized recreation. While alpine ecosystems are hardy and resilient to natural environmental factors, they are particularly vulnerable to human related disturbances and may require decades to recover. Although substantial progress has been made in developing techniques to restore damaged alpine landscapes, this technology is still not capable of restoring alpine plant communities to their pre-disturbance condition (*Hoffman 2006*).

As the number of off-highway vehicles (OHV's) continues to increase on most roads and OHV trails in and around the Weminuche Landscape, the potential for disturbance to bighorn sheep that use areas adjacent to popular OHV routes also continues to increase each year. The continual annual increase in OHV use observed over the past 5-10 years in and around the Weminuche Landscape is likely to continue for the foreseeable future. Increased motorized disturbance to bighorn sheep in places such as the Tuckerville area may cause animals to move away from preferred foraging areas and into areas with lower quality forage or areas where animals are more vulnerable to predation, leading to increased predation or mortality.

White-tailed ptarmigan populations in the southwest Colorado ore belt, roughly between Telluride, Silverton and Lake City, including some of the Weminuche Landscape, are thought to not be self-sustaining. For this reason, protecting and maintaining fall and winter habitat for adult female ptarmigan is likely to be a key factor in ensuring long-term population persistence in the landscape. Maintenance and protection of fall and winter ptarmigan habitat is especially important given the high site fidelity of wintering birds and the considerable numbers of adult females that are attracted from surrounding breeding habitats to the few suitable wintering sites (*Braun et al. 1976*). Increased motorized and non-motorized recreation in preferred ptarmigan wintering areas could reduce ptarmigan winter habitat quality through increasing the extent of compacted snow areas and increased disturbance to wintering birds. Ptarmigan populations in some portions of the Weminuche Landscape may be especially vulnerable to loss or degradation of fall and winter habitat given that population densities are likely lower than other parts of the species range and may not be self-sustaining (*Larison 2000*).

Other activities that continue to influence habitat capability for sensitive species in the Weminuche Landscape include development of private lands adjacent to public lands, and increasing levels of non-motorized recreation on many trails in the landscape. Influences that continue to affect vegetation in the landscape and therefore affect habitat capability for sensitive species include ongoing fire suppression, personal use firewood harvesting of standing dead trees for use as primary home heating purposes, and natural events such as wild fire, forest insect and disease outbreaks, wind throw events, and avalanches. All these activities have contributed to changes in

the composition, structure, and function of forested habitats in the landscape, and habitat for sensitive species. Cumulative impacts, along with the impacts from the proposed action, were included in the determinations for Sensitive species given above, which do not indicate concern for the status of these species.

3.7 WILDLIFE – MANAGEMENT INDICATOR SPECIES

The 2013 San Juan National Forest Land and Resource Management Plan (Forest Plan) establishes management direction for Management Indicator Species (MIS). Forest Plan direction for MIS addresses maintaining healthy populations of wildlife and fish species. Due to the large number of species that occupy National Forest System lands, a subset of species is identified for analysis purposes that are intended to represent the full range of species. This subset is collectively referred to as MIS. The Forest Plan establishes goals, objectives, standards, guidelines, and monitoring requirements that are specific to MIS. Each action proposed by the agency is analyzed in a manner that discloses its effects to MIS and evaluates its consistency with the management direction contained in the Forest Plan. The analysis then determines what effect project-level impacts might have on Forest-level population and habitat trends for each MIS.

The MIS analysis is based on the best available science such as the most recent Forest-wide habitat and individual MIS assessments, expert professional opinions, and site-specific field review of the analysis area. The most recent Forest-wide habitat and species assessments explain the reasons for MIS selection in the Forest Plan, and contain information on the species life history, conservation status, distribution and abundance on the Forest and on each Ranger District, and population and habitat trends.

The MIS analysis of effects meets the current MIS analysis requirements in the Forest Plan (*SJNF 2013*). All MIS identified in the Forest Plan and reasons for their selection are considered during initial project screening. A detailed analysis was then conducted for those MIS that may be affected by the action alternatives. The analysis describes how the alternatives would likely affect Forest-wide habitat and population trends (direct and indirect effects section, below).

A detailed analysis is intended to disclose the potential effects of the action on MIS and their habitats in a manner that identifies the relationship between the action being considered and the long-term viability of the MIS on the administrative unit, the entire San Juan National Forest. For this analysis, the "effects of the action" include the direct and indirect effects to the species caused by the proposed project, and are effects that are reasonably certain to occur. "Reasonably certain to occur" requires existence of clear and convincing information that establishes an effect to the MIS will be caused by the proposed action. This requires that a cause and effect relationship be established that is not merely speculative or based on remote possibilities. Principals of population ecology using the concept of species limiting factors as they relate to reproduction, growth, mortality rates, and distribution of MIS are applied whenever possible.

Most MIS analyzed in detail have either been observed or reported on NFS lands in the Weminuche Landscape. Additionally, most MIS have habitat that is well distributed across the SJNF. It should also be noted that within and adjacent to NFS lands in the Weminuche Landscape there are large amounts of habitat in similar condition, and this habitat is well distributed across the landscape and connected to the larger National Forest administrative unit. The Weminuche Landscape does not provide unique or isolated habitats within which discrete populations are restricted. Most MIS are not species at risk nor are they species that are trending towards protected status. They are well distributed across the SJNF. For some MIS, such as elk, there appears to be no relationship between habitat trends and population trends, with population trends regulated primarily by State hunting season structures.

This section addresses terrestrial MIS only; aquatic MIS are addressed in *Section 3.8*. The full

MIS review can be found in the project record (*Schultz 2015c*).

Affected Environment

There are four terrestrial species identified as MIS in the Forest Plan (*SJNF 2013*). Some species may not be present in the landscape due to the absence of suitable habitat, or suitable habitat is present in the analysis area, but the project alternatives would not affect the species or its key habitat components. Only one terrestrial MIS has habitat present in the Weminuche Landscape and may be affected by grazing: elk. Table 3-6 summarizes the habitat type used by each MIS species, and whether each species was brought forward for detailed analysis regarding this project. The MIS Wildlife Review gives further details and rationale (*Schultz 2015c).* Affects to MIS that are also designated as Forest Service Sensitive Species were also discussed in the project's Biological Evaluation (*Schultz 2015b*).

Table 3-6. Terrestrial MIS identified in the Forest Plan.

MIS Species	Preferred Habitat	Brought Forward for Detailed Analysis?
Birds (1)		
Hairy woodpecker (*Picoides villosus*)	All forested habitats, associated with snags for foraging and nesting. Year-round resident.	No, woodpecker habitat is present in the landscape but nesting and foraging habitat would not be affected by sheep grazing. No further analysis is necessary. Hairy woodpecker was not analyzed further as SJNF MIS.
Mammals (3)		
Abert's squirrel (*Sciurus aberti*)	Ponderosa pine. Year-round resident.	No, squirrel habitat is present in the landscape but would not be affected by sheep grazing. No further analysis is necessary. Abert's squirrel was not analyzed further as SJNF MIS.
American marten (*Martes americana*)	Spruce-fir and cool-moist mixed conifer. Year-round resident.	No, marten habitat is present in the landscape but would not be affected by sheep grazing. No further analysis is necessary. American marten was not analyzed further as SJNF MIS.
Elk (*Cervus elaphus*)	All terrestrial habitats; pine, pinon-juniper and mountain shrublands in winter. Resident.	**Yes,** elk habitat is present in the landscape and food sources are potentially affected by sheep grazing.

Existing habitat for each MIS on FS lands was determined by the use of Geographical Information System (GIS) modeling using vegetative information described in Forest-wide MIS Assessments. Habitat modeling was conducted using habitat structural stage matrices described by Towry (*1984*). In addition, species information on distribution across the Forest, professional judgment of FS wildlife biologists, coordination with CPW biologists, coordination with the USFWS, and field reconnaissance of the Weminuche Landscape was also used.

Abert's squirrel is rarely present in the Weminuche Landscape because of the lack of mature ponderosa pine forests in the landscape (*SJNF 2005a*). The forest conditions with which Abert's squirrel is most closely associated are limited and irregularly distributed within the generally higher elevations of the Weminuche Landscape, making occurrence irregular and densities highly variable, depending on site conditions. Abert's squirrel is also hunted during the small game hunting seasons regulated by CPW. They are habitat specialists and are present in the landscape year round.

The landscape provides optimal hiding cover for elk in mature spruce-fir forests (*SJNF 2005b*). Foraging habitat for elk is abundant in summer in some alpine and krummholz areas. Elk generally

arrive in the landscape during late spring for calving after snow melt, and are present in most habitat types during summer and early fall. Elk generally leave the landscape when snow depth increases in late fall, but a few bull elk remain in the landscape all winter on windswept ridges above timberline.

The mature spruce-fir forests of the landscape provide good foraging habitat for American marten due to the relatively large and undisturbed nature of many forested areas, due to the generally high amounts of large downed wood on the forest floor that provides ready access through the snow pack to the subnivean space, and due to the steep slopes of much of the landscape (*SJNF 2005c*). American marten habitat consists of spruce-fir, cool-moist mixed conifer, high elevation aspen mixed with spruce-fir or cool-moist mixed conifer, and willow riparian adjacent to these habitats (*Buskirk 1994*). The landscape provides high quality marten habitat and sightings and tracks are commonly found in the Weminuche Landscape. The landscape also provides high value travel corridors that link other adjacent large patches of suitable habitat outside wilderness.

The mature spruce-fir, mixed conifer and aspen forests of the landscape provide good habitat for hairy woodpecker due to the relatively mature state of many of these forests in the landscape (San Juan National Forest 2005d). Hairy woodpecker is a widely distributed and relatively abundant primary cavity excavator species within the Weminuche Landscape, being found in all forested habitat types in the landscape (*Winternitz 1976*).

Perhaps the greatest current and near-future (5- to 10-years) influence on habitat conditions for American marten, elk and hairy woodpecker in the Weminuche Landscape is an expanding spruce beetle (*Dendroctonus rufipennis*) outbreak within the upper Pine River and upper Vallecito Creek drainages. It is rapidly expanding from northern and eastern portions of the Weminuche Landscape towards southern and western portions of the landscape. The spruce beetle is the most significant natural mortality agent of mature spruce trees. Spruce beetle outbreaks can cause extensive tree mortality and modify stand structure by reducing the average tree diameter, height, and stand density. Infected trees often take a couple years to die, so infestations appear to be more widespread in following years. Beetles grow to adulthood inside trees and then take off to infect new trees. However, most of the spruce-fir forests in the Weminuche Landscape are mixed with subalpine fir, which are not affected by spruce beetles. For this reason, stands with higher fir composition are less affected by beetles than stands with higher spruce composition.

Most spruce-fir forests in the landscape are mature closed-canopy stands that are at risk to beetles. Within the past five years, the upper third of the Pine River and Vallecito Creek drainages have had extensive areas of mortality of mature Engelmann spruce trees, in some areas exceeding 80% to 90% of mature overstory trees. Within stands affected by spruce beetles, there is a high probability that most spruce trees over five inches dbh will die. Within the next five years the beetle outbreak is expected to expand down the Pine River and Vallecito Creek drainages, and is expected to increase in the upper Florida River and Missionary Ridge portions of the Weminuche Landscape.

The beetle epidemic has the potential to substantially alter spruce-fir habitat conditions for American marten, elk and hairy woodpecker, improving it for elk and hairy woodpecker in the most heavily affected areas, and reducing its value for American marten in the most heavily affected areas. Summer foraging habitat for elk could be greatly improved by the beetle epidemic because mortality of overstory trees is expected to substantially open the canopy of previously closed-canopy spruce stands, allowing substantial increases in forage production in the understory.

The high mortality rates of the older overstory spruce trees would substantially improve the amount and connectivity of hairy woodpecker foraging and nesting habitat within the landscape, and woodpecker populations are expected to increase substantially in response to the ongoing beetle outbreak, similar to post-fire conditions (*Winternitz 1976*). Because woodpecker populations are expected to increase substantially in response to the ongoing beetle outbreak, habitat conditions for many obligate secondary cavity nesting species are also expected to substantially improve in the near future.

Spruce-fir forests make up about 43% of the Weminuche Landscape and 36% of the area currently suitable for sheep grazing in the landscape. Spruce-fir forests are also in close proximity to some preferred sheep grazing areas and therefore some small and localized areas of grazing impacts were observed. However, American marten is unlikely to be substantially affected by sheep grazing or cattle grazing activities because they primarily forage in the overstory tree canopy on red squirrels and on the forest floor for red-backed voles under closed-canopy mature spruce stands, which are unlikely to be substantially affected by sheep or cattle grazing activities.

It is recognized that sheep and cattle congregating during the day under mature closed-canopy spruce-fir forests located immediately adjacent to preferred grazing areas can cause areas of impacts under spruce-fir stands. However, these areas are generally limited in scale, small in area, and in close proximity to parks and alpine zones. They are generally too small in scale to cause population level impacts to marten habitat capability or to cause substantial shifts in marten habitat effectiveness sufficient to result in changes in marten distribution or abundance.

Hairy woodpecker habitat is also unlikely to be affected by sheep or cattle grazing activities because the larger overstory dead and diseased trees that provide most of their foraging and nesting substrate are not affected by grazing activities. Undoubtedly, the small scale and generally low intensity of potential negative effects to American marten, elk and hairy woodpecker habitats associated with domestic sheep and cattle grazing activities in spruce-fir forests in the Weminuche Landscape is very low in comparison to the expectation of near-future widespread, potentially substantial, and expected long-term impacts from the ongoing spruce beetle outbreak that is rapidly expanding within the Weminuche Landscape.

Environmental Consequences

Table 3-7 summarizes the impacts to Forest-wide habitat and population trends for MIS brought forward for detailed analysis that would result from each of the proposed alternatives. Details of the analysis leading to the summary can be found in the project record (*Schultz 2015c*).

Table 3-7. Forest-wide habitat and population trends for MIS.

MIS	Forest-wide Habitat Trend	Forest-wide Pop. Trend	Forest-wide Habitat	Habitat in Landscape Suitable for Grazing under Current Management (Alternative 2)	Habitat in Landscape Suitable for Grazing under Forage Reserve (Alternative 3)	Habitat in Landscape Suitable for Grazing under Preferred Alt. (Alternative 4)
Elk	Stable to down-ward	Stable	Forage – 568,898 Cover – 1,002,716 Winter – 471,234	Forage – 17,271 (3.0%) Cover – 26,455 (2.6%) Winter – 4,652 (1.0%)	Forage – 11,965 (2.1%) Cover – 11,650 (1.2%) Winter – 4,619 (1.0%)	Forage – 11,189 (2.0%) Cover – 9,723 (1.0%) Winter - 4,619 (1.0%)

Table 3-8 shows the amount of terrestrial and aquatic MIS habitat affected by domestic sheep grazing under Alternatives 2, 3 and 4. In order to determine the amount of affected habitat, we determined what areas were suitable and unsuitable for grazing. Suitable range areas are directly affected or have potential to be affected by sheep grazing. Unsuitable areas are most likely unaffected by grazing. Suitable range areas are tundra, grasslands, open meadows, or open forested areas where sheep spend a majority of their time. Unsuitable areas include 1) lakes, reservoirs, ponds, and major rivers, 2) bare road beds, 3) perennial streams, 4) slopes greater than 40%, and 5) rock outcrop, rubble land, granitic, highly erosive, or areas with very wet soils. Although grazing does not occur in areas such as major rivers and perennial streams, livestock could affect riparian habitat adjacent to these areas. The estimates in Table 3-8 have accounted for grazing occurring adjacent to permanent water sources and their riparian areas.

Table 3-8. Acres of habitat affected by domestic sheep grazing for MIS

MIS	Acres of Habitat Affected by Grazing Under Current Management (Alternative 2)		Acres of Habitat Affected by Grazing Under Forage Reserves (Alternative 3)		Acres of Habitat Affected by Grazing Under Preferred Alt. (Alternative 4)	
	Total Acres	Suitable Acres	Total Acres	Suitable Acres	Total Acres	Suitable Acres
Elk Forage	39,787 (100%)	17,271 (43%)	39,787 (100%)	11,965 (30%)	39,787 (100%)	11,189 (28%)
Elk Cover	73,448 (100%)	26,455 (36%)	73,448 (100%)	11,650 (16%)	73,448 (100%)	9,723 (13%)
Elk Winter Range	5,458 (100%)	4,652 (85%)	5,458 (100%)	4,619 (85%)	5,458 (100%)	4,619 (85%)
Elk Winter Concentration	2,664 (100%)	1,992 (75%)	2,664 (100%)	1,992 (75%)	2,664 (100%)	1,992 (75%)

Alternative 1: No Term Livestock Grazing

Alternative 1, the No Grazing Alternative, would be wholly beneficial for all MIS because domestic sheep and cattle grazing would not be re-authorized on National Forest System Lands in the Weminuche Landscape. There would be no impact on Forest-wide habitat trends or population trends from selecting Alternative 1. There would be no potential impacts from sheep or cattle grazing activities to key habitat components for MIS. Selection of Alternative 1 has the potential to provide direct benefits to MIS, but the degree of benefit would probably be small in any given year and limited in scale on the landscape to those small areas affected by domestic sheep grazing and not meeting desired conditions under current management. Benefits to MIS from selecting Alternative 1 would probably be long term (> 10 years) but very small and localized in scale.

Benefits to MIS from selecting Alternative 1 would probably be most pronounced for elk in alpine basins. Benefits to elk foraging areas would come from gradual, long term improvements in the condition of moist alpine areas adjacent to riparian zones or wet meadows. These potential improvements however would be limited to a few localized areas where current utilization levels are high and impacts to soil and vegetation have historically occurred or are continuing to occur.

Alternative 2: Current Management

Selection of Alternative 2 is expected to result in continued improvement in habitat conditions for MIS, but at a much slower rate than would have occurred under Alternative 1. Habitat conditions for MIS are expected to continue to gradually improve under Alternative 2 because there has been a substantial decline in the number of domestic sheep grazed in the Weminuche Landscape from historical numbers, but the number of sheep grazed in the landscape has been quite stable for the past 30 to 45 years. Permitted numbers of domestic sheep grazing in the Weminuche Landscape

have dropped about 59% from a high of about 10,800 animals in the early 1970's to about 4,400 animals currently. In addition, numbers of sheep grazing on the San Juan National Forest have dropped about 95% from a high of about 216,600 animals in the 1930's to about 10,800 currently. As numbers of sheep have declined in the landscape, habitat conditions for MIS, especially those MIS that forage in alpine areas in mid to late summer, have had a long term and gradual improvement in foraging habitat conditions. Gradual improvements in habitat conditions for MIS are expected to continue for some time in the future even if numbers of sheep remain relatively stable over the next few (5+) years because alpine plants have a relatively short growing season and recovery processes are slower than in lower elevation habitat types.

Selecting Alternative 2 would have both positive and negative effects for MIS. Selecting Alternative 2 would have gradual beneficial effects for MIS because gradually improving habitat conditions for MIS would continue and current habitat capability for MIS would be maintained. Alternative 2 would also have gradual negative effects for MIS, compared to Alternative 1, because a few localized areas would continue to be affected by sheep grazing activities, such as near the alpine/spruce-fir interface. Selecting Alternative 2 would be generally beneficial for MIS because of continued gradual improvement in habitat conditions, but much less so than selecting Alternative 1, because improvement in habitat conditions would probably occur over a longer time frame and be of a lower magnitude than under Alternative 1. The scale of habitat improvement from selecting Alternative 2 would likely be small and limited to those areas that are being degraded by livestock grazing under current management. In general, habitat conditions are expected to continue to gradually improve in most areas under Alternative 2, but habitat conditions for MIS would continue to be impacted in a few localized areas.

Under current management, an average of about 34% of the habitat in the landscape for the four MIS is considered suitable for sheep grazing. Displayed another way, on average about 66% of the habitat for the four MIS in the Weminuche Landscape is considered unsuitable for sheep grazing under current management. For the one MIS whose habitat could be affected by the project (elk) the amount of habitat suitable for sheep grazing under Alternative 2 represents from 1% to 3% of its habitat Forest-wide. For this reason, selection of Alternative 2 is unlikely to cause measurable changes to Forest-wide habitat trends or population trends for elk.

Population trends for elk are controlled primarily by annual hunter harvest and do not appear to be correlated with the amount of available habitat on the Forest (*SJNF 2005b*). Therefore, selection of Alternative 2 is unlikely to affect elk population trends forest-wide. The slight habitat improvements resulting from changes in sheep or cattle grazing areas or practices in the Weminuche Landscape are unlikely to cause measurable changes in the amount of elk habitat or elk populations at the scale of the entire San Juan National Forest. Changes in habitat capability for elk are likely to be very small in comparison to the relatively large amounts of habitat available at the Forest-wide scale. The changes to elk habitat expected from the rapidly expanding beetle outbreak are expected to far exceed those expected from any management changes that might result from selecting one alternative versus another. Elk are widespread across the Forest and population trends and habitat trends are stable to slightly downward, respectively. In addition, the impacts of sheep and cattle grazing to elk habitats is generally limited to a few localized areas and thus is unlikely to affect more than a few individuals and would not cause a measurable change to habitat or populations trends at the Forest-wide scale.

Alternative 3: Adaptive Management /Forage Reserves

For all MIS, Alternative 3 is expected to be more beneficial than Alternative 2 due to specific Design Criteria and adaptive management actions designed to meet or move ecological conditions towards the project's desired conditions, and due to the closing of vacant allotments that could be restocked under Alternative 2. Selecting Alternative 3 would general maintain current rangeland conditions in active allotments and areas authorized for forage reserves, but would result in fewer benefits to wildlife and habitats and result in slower rate of meeting or exceeding desired conditions in areas where impacts are currently occurring, compared to Alternative 1 or Alternative 4. Selecting Alternative 3 may affect small numbers of individuals in localized areas but is unlikely to affect populations. Effects from selecting Alternative 3 would be limited to minor changes in species abundance or local use patterns only. Selecting Alternative 3 is not expected to result in negative consequences to MIS populations from the standpoint of affecting viability at the Forest-wide scale.

Selecting Alternative 3 would be generally beneficial for MIS, although less so than under Alternative 1 or Alternative 4, but more so than selecting Alternative 2. The improvements in habitat conditions for MIS expected to occur under Alternative 3, compared to Alternative 2, are likely to be generally small and limited to a few localized areas where habitat conditions are being affected by sheep grazing activities under current management practices. For example, under Alternative 3 there would be a 49% reduction in the acres of alpine and spruce-fir habitats suitable for domestic sheep grazing (about 21,849 acres), compared to Alternative 2 (about 42,465 acres). Under Alternative 3 only 21% of the elk habitat in the Weminuche Landscape would occur in areas suitable for livestock grazing, compared to 39% of elk habitat under Alternative 2.

Selecting Alternative 3 would be generally beneficial for MIS, more so than selecting Alternative 2, but less than selecting Alternative 1 or Alternative 4, because improvement in habitat conditions would probably occur in a shorter time frame than under Alternative 2, but over a longer time frame than under Alternative 1 or Alternative 4. In general, habitat conditions are expected to continue to improve in most areas under Alternative 3, probably at a faster rate and to a greater degree than under Alternative 2, but at a slower rate and to a lesser degree than under Alternative 1 or Alternative 4. Under Alternative 3, habitat conditions for MIS would continue to be impacted in a few localized areas where grazing impacts are currently occurring.

The application of adaptive management strategies and Design Criteria under Alternative 3 should result in more rapid improvements in habitat conditions in some localized areas where sheep grazing impacts are currently occurring (Alternative 2). This is because adaptive management strategies would not be applied under Alternative 2. Although more rapid improvement in habitat conditions for MIS is expected under Alternative 3 than under Alternative 2, improvements in habitat conditions as a result of the adaptive management approach are likely to be too small to affect populations of MIS or the total amount of habitat available in the Weminuche Landscape.

Under Alternative 3, an average of about 22% of the habitat in the landscape for the four MIS is considered suitable for sheep grazing, compared to about 34% under Alternative 2. Displayed another way, on average about 78% of the habitat for these four species in the Weminuche Landscape is considered unsuitable for sheep grazing under Alternative 3, compared to 66% under Alternative 2. Therefore selection of Alternative 3 would provide a 12% reduction in the amount of habitat affected by grazing in the landscape, compared to Alternative 2. For the one MIS whose habitat could be affected by the project (elk), the amount of habitat suitable for sheep grazing under

Alternative 3 represents from 1% to 2% of its habitat Forest-wide. For this reason, selection of Alternative 3 is unlikely to cause measurable changes to Forest-wide habitat trends or population trends for elk.

Population trends for elk are controlled primarily by annual hunter harvest and do not appear to be correlated with the amount of available habitat on the Forest (San Juan National Forest 2005b). Therefore, selection of Alternative 3 is unlikely to affect elk population trends forest-wide. The slight habitat improvements resulting from changes in sheep or cattle grazing areas or practices in the Weminuche Landscape are unlikely to cause measurable changes in the amount of elk habitat or population trends at the scale of the entire San Juan National Forest. Changes in habitat capability for elk due to selecting Alternative 3 are likely to be very small in comparison to the relatively large amounts of habitat available at the Forest-wide scale. As with Alternative 2, the changes to elk habitat expected from the rapidly expanding beetle outbreak are likely to far exceed those expected from any management changes that might result from selecting one the EIS alternative versus another. Elk are widespread across the Forest and population trends and habitat trends are stable to slightly downward, respectively. In addition, the impacts of sheep and cattle grazing to elk habitats is generally limited to a few localized areas and thus is unlikely to affect more than a few individuals and would not cause a measurable change to habitat or populations trends at the Forest-wide scale.

Alternative 4: Adaptive Management / Vacant Allotments with Restocking Requirements

For all MIS, Alternative 4 is expected to be more beneficial than Alternative 3 or Alternative 2 due to specific Design Criteria and adaptive management actions designed to meet or move ecological conditions towards the project's desired conditions, and due to not including the forage reserve allotments proposed under Alternative 3. Alternative 4 also includes the requirements for restocking the vacant allotments, which would make it more unlikely that they would be grazed than under Alternative 2. Selecting Alternative 4 would general maintain current rangeland conditions in active allotments, but would result in fewer benefits to MIS habitats and result in slower rate of meeting or exceeding desired conditions in areas where impacts are currently occurring, compared to Alternative 1. Selecting Alternative 4 may affect small numbers of individuals in localized areas but is unlikely to affect populations. Effects from selecting Alternative 4 would be limited to minor changes in species abundance or local use patterns only. Selecting Alternative 4 is not expected to result in negative consequences to MIS populations from the standpoint of affecting viability at the Forest-wide scale.

Selecting Alternative 4 would be generally beneficial for MIS, although less so than under Alternative 1, but more so than selecting Alternative 3 or Alternative 2. The improvements in habitat conditions for MIS expected to occur under Alternative 4, compared to Alternatives 3 and 2, are likely to be generally small and limited to a few localized areas where habitat conditions are being affected by sheep or cattle grazing activities under current management practices. For example, under Alternative 4 there would be a 56% reduction in the acres of alpine and spruce-fir habitats suitable for domestic sheep grazing (about 18,688 acres), compared to Alternative 2 (42,465 acres), and an 14% reduction compared to Alternative 3 (21,849 acres). Under Alternative 4 only 18% of elk habitat in the Weminuche Landscape would occur in areas suitable for livestock grazing, compared to 21% under Alternative 3 and 39% under Alternative 2.

Selecting Alternative 4, similar to Alternative 3, would have both positive and negative effects for

MIS. Selecting Alternative 4 would have beneficial effects for MIS, compared to Alternative 3 and Alternative 2. Although the same adaptive management strategies and Design Criteria applied under Alternative 4 would also be applied under Alternative 3, the three forage reserve allotments authorized under Alternative 3 would not be authorized under Alternative 4. Therefore Alternative 4 is expected to result in improvements in habitat conditions in some localized areas where sheep and cattle grazing impacts are currently occurring, similar to Alternative 3. There would also be a portion of the landscape without grazing under Alternative 4 that would be authorized for grazing under Alternative 3 (three forage reserve allotments). Also similar to Alternative 3, Alternative 4 would have negative effects for MIS, compared to Alternative 1, because a few localized areas would continue to be affected by sheep and cattle grazing activities within the remaining active allotments, such as near the alpine/spruce-fir interface.

Selecting Alternative 4 would be generally beneficial for MIS, more so than selecting Alternative 3 and much more so than selecting Alternative 2, but less than selecting Alternative 1. This is because improvement in habitat conditions would probably occur in a shorter time frame than under Alternative 3, but over a longer time frame than under Alternative 1. In general, habitat conditions are expected to continue to improve in most areas under Alternative 4, but across a larger portion of the landscape than under Alternative 3 and Alternative 2, but habitat conditions for MIS would continue to be impacted in a few localized areas.

Under Alternative 4 the application of adaptive management strategies and Design Criteria should result in more rapid improvements in habitat conditions in some localized areas where sheep grazing impacts are currently occurring (Alternative 2). This is because adaptive management strategies would not be applied under Alternative 2. Although more rapid improvement in habitat conditions for MIS is expected under Alternative 4 than under Alternative 2, improvements in habitat conditions as a result of the adaptive management approach are likely to be too small to affect populations of MIS or the total amount of habitat available in the Weminuche Landscape.

Under Alternative 4, an average of about 18% of the habitat in the landscape for the four MIS is considered suitable for sheep grazing, compared to about 22% under Alternative 3, and 34% under Alternative 2. Displayed another way, on average about 82% of the habitat for these four species in the Weminuche Landscape is considered unsuitable for sheep grazing under Alternative 3, compared to 78% under Alternative 3 and 66% under Alternative 2. Therefore selection of Alternative 4 would provide a 16% reduction in the amount of habitat affected by grazing in the landscape, compared to Alternative 2, and a 4% reduction compared to Alternative 3. For the one MIS whose habitat could be affected by the project (elk), the amount of habitat suitable for sheep grazing under Alternative 4 represents from 1% to 2% of its habitat Forest-wide. For this reason, selection of Alternative 4 is unlikely to cause measurable changes to Forest-wide habitat trends or population trends for this species.

Population trends for elk are controlled primarily by annual hunter harvest and do not appear to be correlated with the amount of available habitat on the Forest (*SJNF 2005b*). Therefore, selection of Alternative 4 is unlikely to affect elk population trends forest-wide. The slight habitat improvements resulting from changes in sheep or cattle grazing practices in the Weminuche Landscape are unlikely to cause measurable changes in the amount of elk habitat or population trends at the scale of the entire San Juan National Forest. Changes in habitat capability for elk due to selecting Alternative 4 are likely to be very small in comparison to the relatively large amounts of habitat available at the Forest-wide scale. As with Alternative 3 and Alternative 2, the changes

to elk habitat expected from the rapidly expanding beetle outbreak are likely to far exceed those expected from any management changes that might result from selecting one EIS alternative versus another. Elk are widespread across the Forest and population trends and habitat trends are stable to slightly downward, respectively. In addition, the impacts of sheep and cattle grazing to elk habitats is generally limited to a few localized areas and thus is unlikely to affect more than a few individuals and would not cause a measurable change to habitat or populations trends at the Forest-wide scale.

Cumulative Impacts

Other activities that continue to influence habitat capability for MIS in the Weminuche Landscape include development of private lands adjacent to public lands, increasing levels of jeep and OHV traffic on most roads in the landscape, and substantial and increasing amounts of recreational use on many non-motorized trails in the landscape. Influences that continue to affect vegetation in the landscape and that therefore could affect habitat capability for MIS, include ongoing fire suppression, personal use firewood harvesting of standing dead trees for use as primary home heating purposes, and natural events such as wild fire, insect and disease outbreaks such as the ongoing bark beetle outbreak, wind throw events, and avalanches. All these activities have contributed to changes in the composition, structure, and function of habitat for MIS in the landscape. The impacts of the proposed action, in addition to cumulative impacts, are not substantial enough to create concern for these MIS species, and in fact, are an improvement over current conditions.

3.8 FISHERIES

Threatened and Endangered Species
Affected Environment

A Biological Assessment (BA) was conducted to evaluate the potential effects from domestic livestock grazing in the Weminuche Landscape to federally threatened or endangered fish species, species proposed for federal listing, and critical habitat as designated by the U.S. Fish and Wildlife Service (USFWS). The BA addresses those listed species and/or their critical habitats that are known to occur or have the potential to be affected by actions occurring on the San Juan National Forest, such as water depletions that might affect downstream critical habitats and has been placed in the administrative record for this project (*Schultz 2014*).

Analyzing and disclosing the effects of this grazing analysis project to federally listed species is needed to comply with the Endangered Species Act (*P.L. 93-205*), as amended; the National Forest Management Act (*P.L. 94-588, FSM 2670*); and the National Environmental Policy Act (*P.L. 91-190*), as amended.

There is no designated critical habitat for any listed species in the Weminuche Landscape. There are five listed aquatic species that occur on the SJNF (*USDI 2015*): bonytail, Colorado pikeminnow, humpback chub, and the greenback cutthroat trout. Of these, the Colorado pikeminnow and the razorback sucker could be impacted by water depletions as part of the Preferred Alternative and are discussed below. The remaining three are not located in, or downstream from, the analysis area and are determined to have **"no effect"** from the Preferred Alternative; they are not discussed further in this document.

Environmental Consequences

Alternatives 1 and 2

Under these alternatives there would be no new water depletions (stock ponds or spring developments) authorized from the San Juan River Basin therefore there would be **"no effect"** to downstream listed fish species in the San Juan River Basin.

Alternatives 3 and 4

Alternatives 3 and 4 include the development and/or maintenance of five water sources for livestock use in the Spring Gulch Allotment and nine water sources for livestock use in the Canyon Creek Allotment. The water improvements would result in a net water depletion of approximately 1.6 acre-feet per year from the San Juan River Basin.

Under these alternatives the water depleting activities described above would be authorized in the San Juan River Basin. In August of 2013, the Fish and Wildlife Service provided the San Juan National Forest with a Biological Opinion (BO) for the Final San Juan National Forest Land and Resource Management Plan, which established thresholds for water depletions that would require further consultation with USFWS. The water depletions associated with the BA for Weminuche Landscape Grazing Analysis do not exceed the 2.5 acre-foot threshold and therefore are covered under the aforementioned Section 7 consultation, which resulted in a **"may effect, likely to adversely affect"** cumulative finding for the Forest Plan. No additional consultation will be conducted for downstream listed fish including Colorado pikeminnow and razorback sucker. This BO is on file at the Columbine Ranger District (*USDI 2013*).

No water developments are proposed for sheep grazing in the Analysis Area. In the event cattle grazing is authorized in the Spring Gulch Allotment, Burnt Timber Allotment, Canyon Creek Allotment, and portions of the East Silver Mesa and Tank Creek Allotments identified as suitable cattle grazing in Alternative 4, additional water developments may be needed in the future. Water depletions associated with these water developments will be assessed as necessary when defined as they are not part of this action.

Sensitive Species
Affected Environment

U.S. Forest Service (USFS) Region 2 sensitive species are designated by the Regional Forester of the Rocky Mountain Region. For the SJNF, four fish species are designated as sensitive: Colorado River cutthroat trout (CRCT), flannelmouth sucker, bluehead sucker, and roundtail chub. Of these four species, only CRCT is known to occur within the project area and has the potential to be impacted by this project. The bluehead sucker, flannelmouth sucker, and roundtail chub are not located in the project area and will not be affected by the Preferred Alternative and they are not included in any further analysis. A Biological Evaluation (BE) addressing Forest Sensitive Species has been prepared and placed in the administrative record for this project (*Kampf 2015*).

Genetically pure CRCT are known to occupy 14 streams on the SJNF. Core Conservation populations of CRCT are located in two stream reaches in the analysis area, Grasshopper Creek located in the Tank Creek Allotment and West Virginia Gulch located in the Virginia Allotment. These populations are known to be Colorado River lineage CRCT and are not designated as threatened under the Endangered Species Act. A core conservation population is a conservation population that is greater than 99% genetically pure, phenotypically true, and representative of the historic genome of the native Cutthroat Trout (*Hirsch 2013*).

Environmental Consequences

Improper grazing management can potentially degrade riparian and aquatic habitats in a variety of direct and indirect manners (*Platts 1981, 1991*). Direct effects from permitted livestock grazing to fish include directly stepping on individual fish and trampling redds. Indirect effects may include a change in riparian canopy (through livestock grazing and trampling) that could reduce shade and escape cover, reduced terrestrial invertebrate food sources, stream bank degradation, and increased sedimentation or stream widening. Additionally, livestock grazing may affect a number of other water quality parameters (See *Section 3.2 Watershed*).

Alternative 1: No Term Livestock Grazing

Alternative 1 would not reauthorize sheep grazing in these allotments. This alternative would prevent direct effects associated with livestock trampling of CRCT individuals or their redds, as well as indirect effects associated with livestock grazing.

Alternative 1 will have **"No Impact"** to CRCT core conservation populations.

Alternatives 2, 3 and 4

Neither the watershed for Grasshopper Creek nor the watershed for West Virginia Creek will be authorized for cattle grazing as part of Alternative 4, the Preferred Alternative. Cattle grazing within the analysis area will have **"No Impact"** to the two CRCT populations.

Alternatives 2, 3, and 4 include authorization of sheep grazing in both the Tank Creek and Virginia allotments. Alternative 2 maintains current management and stock numbers in both allotments while Alternatives 3 and 4 include adaptive management Design Criteria to reduce impacts to stream banks and water quality. Under current management, Alternative 2, the stream and riparian areas within the project area are generally in good to excellent condition as assessed by baseline Watershed monitoring (See Watershed Section 3.2) and any aquatic habitat problems within the analysis area tend to be site specific. Water quality has not been noted as a problem in any of the watersheds within the analysis area (See Watershed Section 3.2). Impacts to stream systems that represent the primary concern to CRCT core conservation populations in the Tank Creek and Virginia Allotments are associated with trailing locations that cross stream courses and livestock use in and near the stream. These impacts appear to be minimal as they are isolated and small in the analysis area under current management and would be expected to be lessened with the implementation of adaptive management under alternatives 3 and 4 by manipulation livestock numbers to achieve Desired Conditions if deemed necessary.

Under Alternatives 2, 3, and 4, sheep trailing across streams and livestock watering would continue to occur, therefore the potential for livestock to trample individual CRCT or their redds would remain a concern. It is expected that the overall influence to CRCT populations would be minimal due to the large number of redds during spawning season and sufficient numbers of individuals in the populations to ensure the persistence of both of the core conservation populations under alternatives 2, 3 and 4. Recent fish population monitoring in CRCT streams indicate that CRCT populations are viable under current management. Adaptive management strategies and Design Criteria that require herding sheep away from watercourses along with varying livestock numbers based on resource conditions would likely reduce but not eliminate the potential direct and indirect effects to CRCT under alternatives 3 and 4. Implementation of Forest Plan Standards and Guidelines, adaptive management techniques as described in this EIS and project specific Design Criteria should effectively minimize impacts to watershed resources (See *Section 3.2 Watershed*) and as a result should alleviate both direct and indirect effects to CRCT populations within the analysis area.

Sheep grazing associated with Alternatives 2, 3, and 4 **"May Impact Individuals, but is not likely to cause a trend towards Federal listing or result in loss of viability in the planning area"** to CRCT core conservation populations.

Cattle grazing associated with Alternatives 2, 3, and 4 will have **"No Impact"** to CRCT core conservation populations within the analysis area.

MIS Species

The Forest Plan (*SJNF 2013*) for the SJNF identifies species that are to be used to assess long-term population trends and evaluate continued population viability. These species are designated as Management Indicator Species (MIS). The aquatic MIS known to occur within the project area are the brook trout, brown trout, rainbow trout, and cutthroat trout. A detailed analysis of project effects to MIS fish species is included in the BE addressing Forest Sensitive Species and has been placed in the administrative record for this project (*Kampf 2015*).

Affected Environment

Known MIS fish populations located within the analysis area are displayed in the MIS report located in the BE, however there is the potential that some MIS fish are also located in tributary

streams or other streams and lakes within the analysis area. It is assumed that MIS fish species inhabit the entire length of perennial streams in which fish occur for the purposes of this analysis. Comprehensive fish population records within the analysis area are not maintained by the SJNF.

Environmental Consequences

Improper grazing management can potentially degrade riparian and aquatic habitats in a variety of direct and indirect manners (*Platts 1981, 1991*). Direct effects from permitted livestock grazing to fish include directly stepping on individual fish and trampling trout redds. Indirect effects include changes in riparian canopy (through livestock grazing and trampling) that could reduce shade and escape cover or reduce terrestrial invertebrate food sources, stream bank degradation resulting in loss of spawning or pool habitat due to increased sedimentation or stream widening. Additionally, livestock grazing may affect a number of other water quality parameters (See *Section 3.2 Watershed*).

Implementation of Forest Plan Standards and Guidelines, adaptive management techniques as described in the EIS, and project specific Design Criteria should effectively minimize impacts to watershed resources and as a result should alleviate impacts to MIS populations within the analysis area and those encountered on trailing routes to the allotments. Therefore, **none of the alternatives would alter current population trends or habitat trends for MIS fish species on a Forest-wide scale.**

Alternative 1: No Grazing

Under this alternative, all of the allotments and associated trailing routes would be closed to livestock grazing and the trailing routes would not be used. All of the direct and indirect effects to fish associated with livestock grazing would be eliminated.

Alternative 2: Current Management

Under this alternative, current livestock stocking rates, season dates, and pasture rotation would continue in all allotments and trailing routes would continue to be used as in the past. None of the allotments within the analysis area would be closed and could be available for livestock grazing in the future. Adaptive management techniques would not be used, resulting in direct and indirect effects to continue as they have in recent years. Site-specific environmental effects would likely not improve over time. Although this alternative would likely not lead to population declines for MIS species, there may be more impacts to individual fish within the analysis area when compared to the other alternatives.

Alternative 3: Adaptive Management /Forage Reserves

Under this alternative, adaptive management strategies would be used to maintain and/or move towards desired resource conditions within the analysis area. Grazing permits would be re-issued on the six currently active allotments and the remaining allotments would be used as forage reserves, or closed entirely. Portions of some of the forage reserve allotments would also be closed. The forage reserve allotments would minimize direct and indirect effects of livestock grazing by only allowing grazing up to three out of ten years when compared to permitting these allotments by using historical stocking rates. Direct and indirect effects would be eliminated in the closed allotments and in the portions of the forage reserve allotments that will be closed. Boundary adjustments to the Tank Creek Allotment and the Canyon Creek Allotment, as described in the EIS, would alleviate some of the direct and indirect effects associated with livestock grazing by reducing the available acreage of these allotments; however the effects would be minimal.

Cattle grazing in the Canyon Creek Allotment may increase stress on the riparian areas when compared to sheep grazing (See *Section 3.2 Watershed).* Cattle grazing should not alter current population trends or habitat trends for MIS species on a Forest-wide scale. Design criteria of both a site-specific and general nature would be implemented to minimize impacts to watershed and fishery resources in all active allotments. A monitoring plan would be implemented in support of the adaptive management strategy and should also minimize negative effects to resources. For these reasons, this alternative should reduce direct and indirect effects to fish more than Alternative 2.

Alternative 4: Adaptive Management / Vacant Allotments with Restocking Requirements

Under this alternative, adaptive management strategies would be used to maintain and/or move towards desired resource conditions within the analysis area. Grazing permits would be re-issued as in Alternative 3 with the same effects, but the currently vacant allotments would not be re-stocked without meeting the specific restocking requirements, including more NEPA analysis, effectively eliminating the effects of livestock grazing in these allotments. The boundary adjustments would be the same as Alternative 3 and would have the same effect. Design criteria would be implemented as in Alternative 3 for the active allotments. Monitoring would be the same as Alternative 3 in the active allotments. Due to restrictions on restocking of the vacant allotments as opposed to authorizing forage reserves, this alternative should reduce direct and indirect effects to fish more than Alternative 3.

Additionally, this alternative could authorize cattle grazing in all or portion of the allotments as described above. Generally, grazing cattle poses the potential for more impacts to stream systems and riparian vegetation than sheep grazing and as a result more impacts to fish populations. It is anticipated that the impacts to fish populations would be greater from cattle grazing than with sheep grazing due to the tendency of cattle to congregate in riparian areas, but the direct and indirect effects would be the same. In particular, the headwaters of Tank Creek, Canyon Creek, and McClure Canyon as well as a portion of the Florida River could be influenced by cattle grazing. While project specific Design Criteria may alleviate some of the impacts over time, the monitoring period is such that in the interim between when cattle are grazed and the potential direct and indirect effects are noted in the requiring monitoring some MIS fish population may be influenced by grazing activities. Cattle grazing in the watersheds where MIS fish species are located **may temporarily displace or alter how individuals use affected habitats through habitat alteration and/or disturbance, but these effects will not alter current population trends or habitat trends for MIS fish species at the project or Forest-wide scales.**

Cumulative Impacts

For a detailed description of cumulative impacts to downstream listed fish refer to the Final San Juan National Forest Land and Resource Management Plan (*SJNF 2013*).

Anthropogenic factors such as fish stocking, water development, recreational use, mining activities, timber harvest, grazing, road and trail construction, and outfitter use likely have changed the fish population dynamics in the past within the analysis area

The primary influence to CRCT populations is the introduction of non-native fish species. Past fish stocking in the analysis area has reduced the size, connectivity, and in most cases the genetic purity and presence of CRCT populations (*Young 2008*). Non-native fish introductions represent

the primary driver for the reduction of CRCT population size and genetic integrity in the analysis area. Efforts have been underway to re-establish CRCT in some stream reaches in the analysis area which typically consists of stocking barren waters with genetically pure CRCT; such is the case with Grasshopper Creek. It is unlikely that CRCT populations will naturally expand within the analysis area without the implementation of projects specifically designed to increase CRCT populations or numbers of individuals.

Past fish stocking activities have increased the distribution of MIS fish species within the analysis area at a cost to CRCT available habitat. Any future attempts to increase CRCT distribution may reduce the available habitat for MIS species within the analysis area however; no such projects are currently planned.

High recreational use occurs and may increase in the future within the analysis area. Fishing regulations designed to protect core conservation populations of CRCT should serve to protect these populations regardless of increased recreational use over time. Increased fishing pressure and the resulting increased stream access at trail locations may increase isolated sedimentation in the stream and reduction of streamside vegetation. These impacts are expected to be minimal to CRCT populations.

High recreational use within the analysis area may influence MIS fish populations by increased fishing pressure similar to CRCT as well as keeping MIS fish for food subject to State fishing regulations. The effects are expected to be minor and in the unlikely event of substantial reduction of MIS fish populations as a result of high recreational use, these populations could be supplemented by fish stocking, which is regulated by Colorado Parks and Wildlife.

Other anthropogenic influences will likely be minimal on CRCT and MIS populations in the future due to the implementation of Forest Plan standards and guidelines and special management for core conservation populations of CRCT. Additionally, impacts would likely be minimized since the designation of the Weminuche Wilderness and the Colorado Roadless Rule due to the lack of motorized travel and limited future development. Discussions with resource Program Leaders indicate that there are no additional projects planned in the Analysis Area that would add to the cumulative effects. Cumulative impacts, along with the impacts from the proposed action, were included in the determinations for species given above, which do not indicate concern for the status of these species.

3.9 SOCIOECONOMICS

Affected Environment

The social and economic implications of forest resource management are of interest to local residents surrounding federal lands, forest users, and other people throughout the area. The project area contains approximately 89,260 acres in La Plata County, approximately 65,480 acres in Hinsdale County, and approximately 11,890 acres in San Juan County, Colorado.

The current grazing permittees, along with their families, business managers, and ranch hands, primarily live in La Plata County. The communities most likely to be impacted by this project are those in which the permittees and/or their primary business managers live, pay taxes, and do business. Those communities include Durango, Bayfield, and Ignacio and are all located within La Plata County.

Some of the livestock are pastured in San Juan County, New Mexico during part of the winter months while they are not on federal lands. However, economic effects of this pasturing are limited to pasture leases with a few landowners, with most other business expenses concentrated in La Plata County, Colorado; therefore this analysis focuses mostly on the economic conditions in La Plata County. Nevertheless, National Forest System land management decisions are only one of many factors that can influence local economic conditions, which are affected by broader regional economic conditions. In order to provide proper context, this affected environment section begins with an overview of Colorado's Four Corners region's economic base, including relevant employment and income statistics.

In addition to these grazing opportunities, the area is used by residents and visitors for recreation activities, including hunting and wildlife viewing of bighorn sheep. Specific recreation analysis is highlighted in the *Recreation* section of this document, and potential impacts to bighorn sheep are outlined by alternative in the *Wildlife* section of this document. This section highlights the importance of tourism and bighorn sheep in the area to people that have expressed these values, in contrast to the values and benefits provided through the grazing program.

Geography

La Plata County, in southwestern Colorado, encompasses approximately 1,087,000 acres (or 1,700 square miles) of land area, the 27th largest county in the state. La Plata County contains major corridors for both east-west travel, Highway 160, and north-south travel, Highway 550. River systems running through the county include the La Plata, the Animas, the Florida, and the Pine. The federal government manages approximately 39 percent of the land base within La Plata County; the majority is within the San Juan National Forest.

Demographics

La Plata County includes the population center and county seat, Durango. The County has about 52,000 residents (2013), the 15th most populated county in Colorado. With a population change of 18 percent between 2000 and 2013, La Plata County's percent of population change was about the same as that as the state's percent of population change, and higher than the nation's. La Plata's median age has also increased faster than both the state and national average. Between 2000 and 2013 the County's median age increased from 35.6 to 38.3. The state's median age is 36.1 and nationally the median age is 37.3. This increase in La Plata's median age highlights the number of retirees coming into the area, attracted to the quality of life and lifestyle amenities the area offers.

Regional Economics

In 2015, Colorado's economy continues to improve, largely outperforming the rest of the nation in recent years. Despite relatively robust job growth, Colorado is burdened by the legacy of two acute recessions in 2001 and 2007-2009 that have caused divergences in job recovery rates between the state's metro, economically diverse, Front Range counties that are recovering faster than smaller, less economically diverse counties in the Central Mountains, Western Slope and elsewhere (*CODOLA 2014a*). A closer look at Colorado's Four Corners region (Archuleta, La Plata, Montezuma, San Juan and Dolores Counties) reveals that the area had approximately 50,436 wage earners and self-employed jobs in 2012. The largest sources of jobs came from Government (19%), Retail (11%), Health Services (11%) and Accommodations / Food Services (10%).

Residents in the Four Corners region receive about 61% of their income from earnings, which is lower than the state average of 70%. Similarly, the share of government transfers (government payments to individuals) was at 16% compared to the state at 13%. These reflect the region's slightly larger share of retirees than the state as a whole (*CODOLA 2012*).

Another approach to assess the relative significance of different industries in a local economy is through an "Economic Base Analysis'. This approach looks at how different sectors (e.g. individual industrial sectors and the household sector) bring in money and contribute to additional employment throughout the economy. It begins with dividing employment and personal income into two groups: (1) those that bring in outside dollars to the area and thus are 'basic' to the local economy (directly or indirectly), and (2) those that are the result of spending for local services.

Technical detail on Economic Base Analyses is documented by Colorado's State Demographer's Office (*CODOLA 2011*). According to an Economic Base Analysis for the Four Corners Region, households (especially spending/non-labor income from retirees) bring in the most significant amounts of money and support about 8,700 jobs in the Four-Corner region; this is followed by the tourism sector, another significant driver generating nearly 8,500 jobs. Agricultural sectors support about 2,600 jobs in the region (*CODOLA 2012*).

The Economic Environment of La Plata County

Residents in La Plata County receive about 61.1% of their income from labor earnings, 27.4% from dividends, interests/rents, and 11.5% from government transfers (such as retirement and medical payments to individuals). The county had approximately 38,000 wage earners and self-employed jobs in 2013. Major sources of employment are from Government (15%), Retail (10%), Health Services (9.8%), Construction (9.6%) and Accommodations / Food Services (9.1%) (*U.S. Department of Commerce 2014*).

In terms of wages, the top five industries with the highest annual average wages in the county were mining ($99,002), information service ($56,111), financial activities ($55,518), government ($50,399) and professional / business services ($49,285).

Across all industries, the average earning per job and per capita personal income are $44,405 and $46,633, respectively. Since 1990, the annual unemployment rate ranged from a low of 2.8% in 2007 to a high of 7.1% in 2010. The county's unemployment rate was 5.5% in 2013 (*US Department of Labor 2014*).

A 2013 Economic Base Analysis reveals that the most significant drivers in the county, generating or supporting jobs include: the tourism sector (5,920 jobs), households, especially spending/non-

labor income from retirees (4,385 jobs), the government sector (2,355 jobs), education and health services (1,970 jobs), and the agribusiness sector (1,570 jobs) (*CODOLA 2013*).

Tourism and the Recreation Economy

Prior to examining the sector that is directly related to this grazing environmental analysis (the sheep and lamb industry), the tourism industry, La Plata County's lead economic driver, is discussed here first. Tourism is a very labor-intensive industry; jobs include those in the trade, service, and lodging sectors. From the employment and wages statistics discussed previously, it is evident that while tourism related sectors such as retail and accommodations/food service are one of the top five major sources of employment in the county, they are not one of the top industries in terms of average wages. Nonetheless, the industry creates ripple effects across the local economy, benefiting other non-tourism oriented sectors such as construction, real estates, and governments. For example, travelers to La Plata County who stayed overnight spend a total of $253.5 million in 2013, generating $7.2 million in local taxes and $5.8 million in State taxes (*Dean Runyan Associates 2014*).

Visitors come to La Plata County for a variety of reasons; from general sightseeing, skiing, snowmobiling, hunting, fishing, rafting, hiking, biking, and wildlife viewing, to specific destination events such as film festivals. The San Juan National Forest provides opportunities and settings for many of these activities. The latest Forest Service National Visitor Use Monitoring (NVUM) report documented a total of 1.2 million visits to the San Juan National Forest in 2011. A 'visit' is defined as the entry of one person upon the forest to participate in recreation activities for an unspecified period of time. A National Forest visit can be composed of multiple site visits to different parts of the forest (*NVUM 2015*). Some of the most popular primary (main) activities for the San Juan National Forest include hiking / walking (23% main participation rate), relaxing (28%), downhill skiing (12%), and Viewing Natural Features (9.8%).

Note that although surveyed visitors were asked to identify their main recreational activity, they were also asked to provide information about other activities they participated in. Most national forest visitors participate in several recreation activities during each visit. For example, although only 1.6% of the visitors to the San Juan National Forest identified Wildlife Viewing as their main recreational activity, the survey revealed that 45% of all visitors participated in Wildlife Viewing. Other less common recreation activities include Motorized Water Activities (1.4% participation, 0.2% main activity), Cross-country Skiing (0.6% participation, 0.3% main activity), Hunting (0.4% participation, 0.3% main activity), Snowmobiling (0.2% participation, 0.2% main activity) and Other Motorized Activity (0.9% participation, 0.2% main activity).

Visitors traveling to the San Juan National Forest spend an average of $723 (median = $200) per party on an average trip. 58% of the visits include overnight(s) stay away from home, staying on average 6.3 nights per visit. Of those overnight visitors, 51% stayed at campgrounds on the forest while 23% rented private homes. Other modes of lodging include Staying at Home of Friends/Family (10%), Undeveloped Camping on the Forest (8%), Own Home (6%), Private Campground (4%), Other Public Campground (4%), National Forest System cabins (3%) and Other Lodging (1%).

Overnight and day-trip visitors alike spend their disposable income in the local communities, supporting the regional economy. Based on the above NVUM data and Forest Service agency economic contribution analysis (multipliers generated with 2012 IMPLAN Input-Output model), San Juan National Forest's visitors spending contributed to more than 700 full and part time jobs,

approximately $21 million in labor income and $34 million in Gross Regional Product (which contributes to the Nation's Gross Domestic Product) to the local economy. Due to data availability, Forest Service visitation and economic contribution information are available at the national, regional, and forest level, and not at the county or ranger district level. Nonetheless, forest-wide information provide important context on the types of recreation and associated economic effects that occur in the region.

Recreational use within the project area is high in some portions of the project area, especially with infrastructure such as trailheads, campgrounds, and trails and scenic or natural features such high alpine lakes, wildflowers, meadows, or wilderness solitude. Unfortunately, many of the same features/infrastructure that are used by recreational users are also necessary for domestic sheep grazing – thus creating user conflicts. In some cases, seeing the sheep grazing is a unique view for a visitor to the area and no conflict exists, but for more local or regular users, the sheep are seen as a negative.

Conflict can be a one-way behavior, meaning one group (recreational users) has conflict with the other group (sheep grazing), but the second group has no conflict with the first group. The conflict for recreational users can be direct; the actions of sheep grazing (destruction of wildflowers, site/smell of manure, aggressive guard dogs, etc.) directly affect a person's ability to complete their recreational activity. Or the conflict can be one of social values, in that those recreating in the area have personal beliefs about sheep grazing on FS lands, even if they do not actually encounter sheep while recreating.

Rocky Mountain bighorn sheep

Although wildlife viewing and hunting represented a small portion of the primary recreation activities on the San Juan National Forest (see above statistics), they do occur outside of FS lands, and provide additional economic benefits not accounted for above. One example is the importance of Rocky Mountain bighorn sheep, a FS Sensitive Wildlife Species, to the recreation economy. Bighorn sheep is a sought after big game species for both recreation hunters and wildlife viewers alike. In 2014, the State of Colorado issued 262 hunting licenses (203 rams and 59 ewes) for Rocky Mountain bighorn sheep to a total of 232 hunters; the total harvest was 132 (109 rams and 23 ewes) with a 57% success rate (59% for rams and 50% for ewes) (*CPW 2015b*).

The bighorn sheep Game Management Unit specific to La Plata County include S71 and parts of S28. These units issued a total of 3 licenses (all rams) for 3 hunters in 2014, where 2 harvests were successfully made. Unit S16 is also relevant to this landscape. This unit issued a total of 5 licenses in 2014 (3 rams and 2 ewes) to 5 hunters, where 5 harvests were successfully made (3 rams and 2 ewes).

The opportunity to hunt a bighorn sheep is made available through drawing or raffle sold through the Rocky Mountain Bighorn Society for $25 per ticket. The cost of the actual hunting license for a Rocky Mountain bighorn in 2015 was $254 for residents and $2064 for non-residents. Other secondary markets, such as auctions, exist and generally a much higher price per license is procured. Special auction and raffle licenses for Rocky Mountain bighorn are offered by participating wildlife conservation organizations that return at least 75 % of the proceeds to CPW for research, management and education.

Further, recreation hunting and wildlife viewing in general contribute to the regional economy through visitor spending in nearby communities. In Colorado's southwest region, economic value

generated by wildlife viewing and hunting has been estimated and displayed in Table 3-9 (*Southwick Associates 2014*). Economic contributions of wildlife viewing were not reported at the county level.

Table 3-9. Economic Contributions from Wildlife Viewing and Hunting, 2014.

	Wildlife Viewing, Southwest Region	Hunting, Southwest Region	La Plata County Hunting
	- - - - - - - - - - - - in millions- - - - - - - - - - - -		
Economic output	$213	$82	$11
State and local taxes	$16	$6	$.833
Federal taxes	$14	$6	$.797
Gross domestic product	$117	$51	$6.9
	- - - - - - - - - - - -average annual - - - - - - - - - - - -		
Salaries and wages	$69 million	$31 million	$4.3 million
Full and part time jobs	2,135	1,345	162

These figures are not specific to big game, nor any specific species enjoyed in a specific location, nonetheless, they provide important context on the economic contributions from recreation hunting and wildlife viewing in general.

Bighorn sheep enthusiasts have funded the herd restoration efforts and conservation management through hunting licenses, tags and habitat stamps, as well as through purchasing hunting and wildlife viewing gear and supplies. Such funding are coordinated with CPW and used to continue to support management of bighorn sheep in Colorado.

Poaching of any animal, especially big game is an issue taken seriously by CPW and by hunters and wildlife enthusiasts alike. The CPW offers $500 reward to those with information on cases involving big game or endangered species, and if a case is particularly flagrant, CPW may reward up to $1,000. In 1998, a person was fined $2,500 and sentenced to 4 months in jail for killing a bighorn sheep out of season in southern Colorado, and further ordered to pay $17,500 in civil restitution to the State of Colorado and sentenced to an additional 4 month of home confinement by Federal Court.

Bighorn sheep have value to hunters who will wait years, applying to the drawing for an opportunity to spend the time and energy necessary to hopefully successful harvest a sheep. Bighorn also have value to the many people who enjoy watching them around the state. Especially to those who have put in their personal time, money and commitment, working to bring the herds back throughout their historic range.

Ranching Operation and the Sheep and Lamb Industry

Although the previously described economic base analysis revealed that agribusiness is not a major driver in La Plata County, the sheep and lamb industry may be directly affected by the agency action. Therefore, a brief overview of the U.S sheep and lamb industry is presented here, followed by several relevant statistics specific to Colorado and La Plata County.

The dominant feature of the sheep industry in the United States has been the steady decline in sheep and lamb production and consumption since the mid-1940s. Sheep inventories have shown a steady decline since peaking at 56.2 million head in 1942. During the 1960's, sheep numbers fell each year and were just over 21 million head at the end of the decade (*USDA-NASS 2011*). In 2012, total sheep and lamb inventory in the U.S. was 5.3 million head (*USDA-NASS 2014*). U.S. lamb consumption reflected similar trend.

On a retail equivalent basis, per capita lamb consumption in the U.S. fell from a high of about 6.6 lbs. in 1945 to 3.0 lbs. in 1951. Onward from the 1960s, U.S. per capita lamb consumption began a slow, steady decline to 1.4 lbs. in the early 1980s; 1.3 lbs. in the early 1990s; and about 1.1 lbs. in the early 2000s (*NRC 2008*). Beginning in 2008, U.S. per capita lamb consumption fell from 1.0 lbs. to 0.9 lbs. in 2009 and 0.8 lbs. in 2012 (*USDA-ERS 2014*). Preliminary forecast shows that consumption to remain around 0.7 lbs. - 0.8 lbs. per capita through year 2023 (*USDA-ERS 2015*). Although per capita consumption has been on a downward trend, prices had climbed over the past two decades, hitting all time high in recent years. The average market price at San Angelo, TX for Choice slaughter lambs hovered between $60 to $90/cwt (per hundred weight) during the late 80s and early 90s. Prices averaged around $100/cwt before overshooting $120/cwt after 2004 (*USDA-NASS 2011*).

In recent years, the industry experienced fluctuations. Sheep and lamb prices climbed to unprecedented levels in 2011 ($160/cwt at San Angelo), leading to record cash receipts for Colorado producers, a national production leader. Lamb appeared to have gained greater interest among chefs and locavores, with overall consumer demand increasing (*CU-LSB 2011*). Encouraged and supported by strong prices, producers raised larger flocks of sheep and goats. This partly contributed to a difficult year in 2012 for sheep and lamb producers and feeders across Colorado. The sector struggled with high inventories and record heavy slaughter lamb and yearling weights caused by delayed sales early in the season. As price declined from $160/cwt to $113/cwt, fewer lambs were sold on the open market, which created an oversupply of lamb for slaughter, resulting in a large stockpile of old animals. Some consumers were quick to identify unfavorable changes in the taste profile of the older lamb being sold, further dampening demand (*CU-LSB 2012*). The price of lambs remained low at $111/cwt in 2013 before climbing back up to $159/cwt in 2014, and it is forecasted to linger at the $157-$169/cwt range in 2015 (*USDA-ERS 2015*). Higher prices for red meat in general are helping to strengthen lamb prices, also, consumer demand for grass-fed lamb is on the rise and could potentially affect Colorado's lamb feeding operations (*CU-LSB 2013 and 2014*).

The 2012 USDA Census of Agriculture collected farm production expense information at the state-level. For a typical sheep and lamb operation in Colorado, the total annual farm production expense was $90,250 in 2012. On average, the largest share of the total expense was feed purchased (36% of total), followed by livestock and poultry purchased or leased (29%), hired farm labor (7%), interest expense (5%), gasoline, fuels, and oils purchased (4%), supplies, repairs, and maintenance costs (4%), all other production expenses (4%), cash rent for land, buildings, and grazing fees (3%), property taxes paid (3%), utilities (2%), custom work and custom hauling (1%), fertilizer, lime, and soil conditioners purchased (1%), contract labor / rent and lease expenses for machinery, equipment, and farm share of vehicles (0.8%), chemicals purchased (0.4%), seeds, plants, vines, and trees purchased (0.35%), and production expenses paid by landlords (0.1%) (*USDA-NASS 2014*).

While the largest share of the total expense for a typical sheep and lamb operation in Colorado was feed purchases, a smaller, but related expense is grazing fees. Note that the Census of Agriculture did not break out the cost of grazing fees from cash rent for land and buildings, so it is not known how much of that 3% cost originate from grazing fees (including both public and private rangeland). In the western states, the federal grazing fee for 2015 is $1.69 per head month (HM) for lands managed by the U.S. Forest Service. The 2014 fee was $1.35. An Animal Unit Month

(AUM), treated as equivalent measures for fee purposes, is the use of public lands by one cow and her calf, one horse, or five sheep or goats for a month.

As for private land grazing, lease rates varied by region. In 2013, the average lease rate for privately owned, non-irrigated pasture in Colorado's southwest region was $14.67/head-month (*Tranel et al. 2013*). Note that this rate is based on survey results and reflect only the average condition in the region, as feasibility of private grazing varies depending on factors such as proximity to ranch, or, the mere availability of private pasture in the area. The survey also revealed other information about private grazing such as fencing construction and maintenance. About 27% of the respondents in Colorado's southwest region reported that the pasture landowner provided labor for fence maintenance; 4% of them stated that the costs were shared while 68% of them revealed that the tenants (livestock owner) themselves were responsible for fence maintenance labor. As for materials for fence maintenance, about half the respondents reported that materials were provided by the landowners, half by tenants, and a small percentage of respondents reported sharing the cost of materials.

Besides farm expenditure information, the 2012 USDA Census of Agriculture also collected net cash farm income data for sheep and goat farming operations. In Colorado, 224 sheep and goat farming operations reported positive annual cash income in 2012, with an average net gain of $140,577; while a total of 988 operations reported negative annual cash income in 2012, with an average net loss of $21,230 (*USDA-NASS 2014*). As discussed earlier in this section, livestock prices are volatile; therefore, it is important to note that annual cash flow also fluctuates for agribusinesses. As in other businesses, ranchers may operate at a loss for as long as cash reserves hold out, and, that the growth potential (again, as in any other businesses) depends a great deal on the entrepreneur. Entrepreneurships and motivation are important in the desire to maintain a traditional enterprise such as ranching. Ranchers are not often in the livestock business just to make a profit, but because they value the quality of life that comes with the ranching lifestyle (*Rowe, Bartlett & Swanson, 2001*).

Gentner and Tanaka (*2002*) found that public land ranchers ranked lifestyle attributes above profit maximization. Family tradition, culture and values are some of the more important reasons for maintaining a ranching operation. In Gentner and Tanaka's survey, public land ranchers were asked a series of questions regarding possible strategies when faced with different scenarios, for example, the elimination of seasonal uses of federal grazing and reducing AUMs. For the 'sheep herder ranchers' group, when faced with the hypothetical prospect of elimination of federal grazing in the summer months, about 30% of the respondents stated that they would cut back on livestock production, pass down to next generation, reduce herd, or sell the ranch; a little less than 30% stated that they would intensify their use of private grazing land; 20% of the respondents were not sure what they would do in the face of this change; a little more than 10% of the respondents stated that they would continue their current level of operation; while less than 10% stated that they would diversify their operations either on-ranch or off-range. Examples of diversifying operation include pursuing more or better off-ranch employment, growing different crops for cash sale, offering ranch based recreation, or adding a new class of livestock. Similar responses were given to the scenario of a 50% reduction in AUM for this group. Gentner and Tanaka (*2002*) concluded that public land ranchers are very heterogeneous in terms of their income sources as well as motivations to maintain a ranching operation (from ranch income dependent, to hobby operations, and somewhere in between). Therefore, the assumption that all ranchers operate under the same motivation (i.e. profit maximization) is unfounded.

Ranch Viability and Lands Use

As communities and urban areas grow, the price of neighboring agricultural land increases until it exceeds the income-producing potential the land can provide to farms and ranches. Not only does this happen at the edge of communities, it also happens in attractive settings at the edge of national forests. Base ranch properties of national forest grazing permittees have experienced development pressures in many growth areas across the West, especially near mountain resorts or other communities that offer a variety of amenities. Second-home development can be a significant source of demand for ranch properties in these areas. In addition to attractive land prices, ranchers may also face challenges in terms of operation costs and livestock prices, all subject to local and national markets (i.e. fluctuating prices and consumption demand as discussed in previous section). When costs rise, or livestock prices fall, affecting the profitability of ranch operations, high land prices make land sales an increasingly attractive source of income.

Gentner and Tanaka's survey presented some noteworthy questions faced by public land permittees, such as the seasonal elimination of federal grazing and reduction of AUM. While the majority of ranchers from Gentner and Tanaka's study revealed that they would not sell the ranch when faced with such scenarios; the concern about land-use change (through base ranch properties sales) due to financially non-viable operations is recognized. This issue is about indirect effects, and hinges on whether public land permittees continue operating under reduced or no grazing scenarios. As discussed earlier, individual permittee's financial situation, entrepreneurial capabilities, motivation, etc. are not generally homogeneous, so it is unsound to simply assume a particular chain of event (e.g. base property sales due to increased operational costs, etc.). Nevertheless, agricultural lands and projected land use changes in La Plata County are examined below.

A 2014 property assessment study reviewed county records to determine major land categories in La Plata County: irrigated farm, dry farm, meadow hay, grazing and other lands (*Wildrose Appraisal 2014*). Acreage and land value information are compiled by land classes. In La Plata County, of those lands classified as private agricultural uses, 65% belongs in the grazing land class ($8/acre on average), 14% in the flood land class ($128/acre), 11% in dry farm ($30/acre), 5% in meadow hay ($93/acre), 3% in the sprinkler land class ($90/acre) and 1% in the forest land class ($8/acre).

In support of the 2010 Renewable Resources Planning Act (RPA) Assessment, the U.S. Forest Service forecasted changes in land uses for the coterminous United States in response to three scenarios (*Wear 2011*). Total acreages of nonfederal cropland, pasture, forest, range and urban lands are projected through 2060. Nonfederal urban and built-up land area growth varies by region, the Rockies is projected to gain about 11 million acres by 2060 (a 153% increase from the 2007 reference period). For La Plata County, there were a total of 26,000 acres (2.4% of total county area) of urban and built-up land area in 1997, and it's projected to gain an additional 40,000 acres (averaged from three IPCC-based scenarios) by 2060. In terms of proportion of total county land area, this is a 3.7 percent increase from the 2007 reference period. Naturally, those urban and built-up lands gains are accompanied by losses in other land classes such as cropland, pasture, forest and range cover types. La Plata County is projected to lose approximate 26,000 acres (2.4% of total area) of its nonfederal rangeland; and approximately 4,600 acres (0.4% of total area) of its nonfederal pastureland through 2060. Other land cover losses include cropland and forestland: the

county is projected to lose approximately 4,200 acres (0.4% of total) of its nonfederal forestland and 5,400 acres (0.5% of total) of its nonfederal croplands through 2060 (*Wear 2011*).

Currently less than 3% of La Plata County's land area is in the urban/built-up class, and grazing is the largest class of private agricultural lands, being of relatively low value on a per acre basis (*Wildrose Appraisal 2014*); nevertheless, pasture and rangeland still constitute the majority of land cover conversion projected to occur by 2060. In other words, if and when lands use changes occur in the county (gains in urban / built-up area); it is likely that those gains will come from the conversion of pasture and rangelands.

In discussing concerns regarding open space, it is important to distinguish between open space on public land versus private land. Private land open space may offer scenic, wetland, wildlife habitat, watershed condition, and related benefits. Pastoral landscapes on private lands are often highly valued in certain communities for their scenic and cultural importance. Generally, private land open space does not offer recreation use benefits to the public, although hunting privileges may be extended to certain parties. In addition, private land owners that have not sold developmental rights (e.g. conservation easements) retain the option for future land conversion.

La Plata County's Sheep and Lamb Industry and Regional Economic Contributions Analysis of Grazing on the Weminuche Landscape

From the 1925 Agriculture Census, 97 farms in La Plata County reported a total of 20,571 head of sheep and lambs, with a total value of $261,938 (over $2 million in 2012 dollars). In 1945, 205 farms reported a total of 36,546 head of sheep and lambs, valued at $351,204 (over $3.5 million in 2012 dollars). After the peak of mid-1940s, sheep and lamb productions in La Plata County followed the national trend of steady decline (U.S. Department of Commerce 1927; 1946). By 2012, there were a total of 64 sheep and lamb operations in La Plata County (USDA-NASS 2014). Those operations have a total inventory of 5,483 sheep and lambs; out of which 4,521 head were sold for $612,000 in 2012. USDA classifies sheep and lamb operation as any establishments primarily engaged in raising sheep, lambs, and goats, or feeding lambs for fattening. La Plata County's total sheep and lambs inventory ranked #10 among counties in Colorado; among counties nationwide, La Plata ranked #166 (*USDA-NASS 2014b*).

Ranching operations have economic linkages with other sectors of the economy besides livestock and agricultural sectors. In fact, changes in grazing activities on FS lands have implications for the overall regional economies surrounding La Plata County. An economic contribution analysis is presented here, in order to estimate the Gross Regional Product (which contributes to Gross Domestic Product (GDP)), income, and the employment sustained / supported by AUMs permitted to graze on the Weminuche landscape. It is important to stress that this analysis does not attempt to calculate the economic impacts from all sheep and their ranchers; rather, this AUM-based analysis estimates only the share of employment, income, and GDP derived from permitted grazing on active Forest Service allotments on the Weminuche landscape. Ranchers use FS forage for only a portion of their operations (i.e. summer months), therefore, FS forage accounts for a fraction of the annual feed and forage requirements, which, in turn, represents only a portion of their operations' revenue. Consequently, only a percentage of associated economic impacts can be reasonably attributed to FS land and management. For this reason, the Forest Service relies upon an AUM-based approach for estimating those economic contributions derived from forage provided by authorized grazing on existing allotments on the Weminuche landscape.

For the six active allotments, annual average use was 1,800 AUM for sheep and 252 AUM for cattle (Canyon Creek only) during the past five years. Using this actual AUM usage information along with agency economic contribution model, the regional economic effects in terms of employment, income and Gross Regional Product are estimated. On an annual average basis, permittee grazing on these allotments contribute approximately $580,000 to Gross Regional Product, $300,000 in labor income (*2014 USD*), as well as support / sustain about 11 full and part time jobs in the regional economy. These results reflect indirect and induced economic effects (private sector activities stimulated by FS grazing entering the region's economy) in addition to direct employment and income effects.

This method is unique in its incorporation of unpaid/family labor into the calculation – whereas most traditional I-O studies rely on datasets without unpaid labor. In agricultural operations, family members often provide significant amounts of labor. Excluding unpaid/family labor may lead to an underestimation of the direct employment effect. In areas where unpaid/family labor constitutes a large share of the total labor on ranches and farms, this analytical approach paints a more complete picture. The process for calculating these contribution ratios are documented by the BLM (*Larson 2012*). The Forest Service updated the coefficient specific to Colorado by extracting information pertaining to the ranching industry for the State of Colorado from the 2012 Census of Agriculture, the American Community Survey, as well as from the 2012 IMPLAN® data and software system. To calculate the indirect and induced effects, farm production expenses information as reported by the Census of Agriculture are used as input to the IMPLAN® model.

It is important to note that this analysis employs IMPLAN® to estimate the indirect portion of the employment effects; therefore, the reported job figure here is expressed in terms of 'annual average' of both full and part time total wage and salary employees, as well as self-employed jobs. This method of measuring employment is a standard convention and consistent with methods used by the U.S. Bureau of Labor Statistics. One cannot discern the number of hours worked, or the proportion that is full time versus part time. It is also important to reiterate that the employment contributions calculated are reported simply as jobs, not full time equivalents (FTEs). The impacts include both full time and part time employment, so a person with more than one job could show up more than once in the data. This prohibits comparisons to population data and inferences about the effect on unemployment rates.

Labor income includes all forms of employment income: in addition to wages, it also includes benefits and proprietor income. The value-added (GDP) contributions consist of (1) employee compensation: wages and salaries plus benefits paid by local industries; (2) proprietor income: income from self-employment; (3) other property income: corporate income, rental income, interest and corporate transfer payments; and (4) indirect business taxes: sales, excise, fees, licenses and other taxes paid, including non-income based payments to the government. GDP (or value-added in IMPLAN) is a popular and widely used metric that measures economic activities and outputs, taking into account the incremental value added to a product or service at each step of the production process. It is also critical to note that IMPLAN is a static model representing a snapshot in time. The state-level IMPLAN model used (Colorado) in this analysis is for the year 2012. It reflects only the structure and state of the economy in 2012. Moreover, IMPLAN is used to examine "marginal" changes; results are valid only for relatively small changes to the regional economy. In other words, the results hold with the assumption that there is no substantial resource management action in the region large enough to change the underlying structure and trade relationships of the local economies.

Financial Efficiency Analysis

It is agency policy that financial efficiency analysis be conducted from the perspective of the Forest Service (*FSM 1971*). The Forest Service generally conducts financial efficiency analysis over the initial life of the management decision, a period of ten to twenty years in this case. The main criterion in assessing the financial efficiency is Present Net Value (PNV). Present Net Value is the current value of future benefits and costs over the life of the project discounted at the agency-established rate of 4 percent (*FSM 1971.3*). Table 3-10 displays the PNV for each alternative. Details on the calculations of present value (PV) are found in the project record.

Cost Efficiency

Cost efficiency is an approach that uses the monetary expression of some identifiable benefits and costs, while recognizing that other benefits and costs are best expressed in other terms. Costs expressed in dollar terms here include labor and materials. Benefits expressed in dollar terms here include grazing fees. Other costs and benefits, such as watershed and riparian health or scenic quality, have not been assigned dollar values; therefore, they are expressed using other qualitative terms elsewhere in this EIS and project record. Furthermore, other social and economic effects (operation costs, regional economic impacts, etc.) specific to permittees in general are discussed above.

Table 3-10. Efficiency Analysis (Present Net Value in 2014 dollars)

Forest Service	Alt 1	Alt 2	Alt 3	Alt 4
PV Costs	$0	$69,279	$69,279	$152,827
PV Revenue	$0	$30,117	$30,117	$30,117
PNV	**$0**	**-$39,163**	**-$39,163**	**-$122,711**

It should be reminded that PNV is used as an indicator of financial efficiency and presents but one approach to be used in conjunction with many other non-monetized factors in the decision-making process. A positive PNV indicates that the alternative is financially efficient. Many of the costs and benefits associated with this decision are not quantifiable. These costs and benefits are described qualitatively, in the individual resource sections of this EIS. Management of National Forest lands is expected to yield positive net benefits for the American public, including the consideration of all benefits and costs. These management actions, however, may or may not yield financial net revenues. Descriptions of the differences in PNV between alternatives are explained in the Effects Analysis section below.

Environmental Consequences

Consequences Similar in All Alternatives

In La Plata County, there is both a tribal population and a Hispanic/Latino population that are potentially of interest to land managers. Tribes are engaged with government to government consultation for projects to ensure tribal issues and concerns are addressed throughout the planning processes. With tribal consultation continuing throughout the project, no disproportionately adverse and negative impacts are expected under any of the alternatives to the tribes. Outreach and public meetings were held to be inclusive of Hispanic/Latino communities and with no specific

issues raised from these communities; it is assumed no disproportionate adverse and negative impacts are expected under any of the alternatives.

Alternative 1: No Term Livestock Grazing

Public lands contribute to the competitive advantage of the livestock industry, because in some places the contribution is a low-cost alternative to private grazing lands; while in other places, the contribution is the opportunity for summer range where limited or no private grazing exists. The No Grazing Alternative would reduce public land available for livestock grazing by roughly 162,500 acres. This acreage includes Forest Service lands from all the allotments in the landscape. This alternative would be the least preferred by those stakeholders interested in maintaining FS for grazing use and those currently utilizing the project area under a grazing permit.

For the permittees, this alternative effectively eliminates summer forage opportunity (June till early October is generally the permitted season of use on the Weminuche landscape). While this alternative does not directly dictate permittees' ranching operation during the rest of the year when livestock are off FS land, it would, however, creates enormous burdens in terms of operating costs, and potentially detrimental for those nearing, or already financially non-viable operations and are economically dependent on federal grazing. This is important since summer and early fall are important months for growth of livestock, in preparation of market lamb, slaughter lambs, or feedlot sales for further fattening. As discussed in the Affected Environment, for the average sheep and lamb operation in Colorado, the largest share of the total expense was feed purchase (36% of total). Note that even for public lands ranchers, some of this cost is incurred during the eight or nine months while livestock are off FS lands, excluding time grazed on owned base property or other private pastures, if available. Eliminating grazing on the Weminuche landscape obliges permittees to obtain alternative summer forage (private pasture, other state and federal lands, if available and feasible), or, more likely, incur the costs of additional feed purchases. In any case, the elimination of federal grazing substantially increases the permittee's operation costs. The difficult nature of agribusiness and fluctuating market conditions are the norm and faced by permittees under any alternative. However, under Alternative 1, it is possible that the reduction in available forage (through the elimination of grazing on the landscape) would increase private grazing fees in the surrounding area, due to increased demand from ranchers seeking to replace lost forage. If and when this occurs, this alternative creates additional and lasting burden to the ranching community. It should also be noted that as with any other sectors, but especially in agribusiness, some operators will be profitable while many are not.

These costs on the permittees may not be offset by revenues from marketable gains of livestock, making the ranching business financially non-viable. This analysis alone cannot predict that the permittees would cease livestock operations or put the base property up for sale. Typically, many factors contribute to such a decision. As in other businesses, ranchers may operate at a loss for as long as cash reserves hold out, and, that the growth potential (again, as in any other businesses) depends a great deal on the entrepreneur. Besides entrepreneurship, motivation plays an important role for the desire to maintain a traditional enterprise such as ranching. Continuing operation, diversification, seeking off-ranch employment, or ceasing operations are some of the responses public lands ranchers have considered when faced with the prospect of reduced / eliminations of federal grazing. Detailed discussions and related research findings are found in the Affected Environment section. In terms of regional economic impacts, if off-ranch employment becomes the chosen route, either full-time or as supplemental income for sustaining a financially non-viable ranch, some additional direct and indirect effects (employment, income, contribution to Gross

Regional Product, etc.) will continue to occur in the local economy. On the other hand, if current permittees cease to operate and no further action is taken, those indirect economic contributions to the local economy as described in the Affected Environment section will not be sustained. This is in addition to the losses in direct income, employment, way of life and values associated with maintaining a traditional enterprise such as ranching. It is important to note that the issue of ranch viability (and subsequent land use changes, etc.) hinges on the concept of indirect changes. These effects are not the sole result of Forest Service range management decisions. However, Forest Service management becomes a key contributor if financial viability of the existing operation is doubtful.

Concerns regarding land use changes (through base ranch properties sales) due to financially non-viable operations are also recognized. This issue is about indirect effects, and hinges on whether public land permittees continue operating under this no grazing scenario. As discussed earlier, individual permittee's financial situation, entrepreneurial capabilities, motivation, etc. are not homogeneous; therefore it is unsound to simply assume a particular chain of events (i.e. elimination of seasonal grazing opportunity leads to base property sale, etc.). Nonetheless, this important concern is examined here. Should the permittees find that livestock operations ranch-wide are no longer sustainable in the long-run, sale of the base property, or a sub-divided section of it, could occur. Should this happen, land use may or may not change. It should be noted that if ranch base property sale is considered, some buyers may keep lands in agricultural use, regardless of profitability (e.g. hobby, non-profit agricultural operations, creation of conservation easement by environmental groups, etc.) and maintain the lands as private open space for their scenic, habitat, and other environmental values. On the other hand, other buyers may convert land to developed uses such as residential and possibly commercial. Changes in land use from agriculture to either residential of commercial use decreases private open space. Given the large share of land that are considered open space in the county (see previous section on statistics from the RPA study), such a change would generally be inconsequential in the broader landscape. Finally, the discussion thus far is restricted to the mere calculation of acreages of different land cover types; it is important to be reminded that reductions in open space could affect current benefits to the local community such as pastoral landscapes, wetlands, wildlife habitat, and watershed condition. See other sections in this EIS for a more detailed analysis of those effects.

Recreation and wildlife (specifically bighorn sheep) impacts are some of the important aspects of this environmental analysis. There are concerns that the presence of domestic sheep affects the quality of individual's recreation experience within the project area (these specific impacts and concerns are outlined in the recreation section of this EIS). There are also concerns that physical contact between bighorn sheep and domestic sheep results in an increased risk of disease transmission potential to bighorn sheep, with increased potential for a subsequent bighorn mortality event. Such social and economic impacts could potentially affect the economic activities deriving from recreation (including bighorn sheep viewing and hunting), the associated regional economic contributions to the local economy as discussed previously, as well as continued disruption to recreational users sense of place in the area. Since this alternative eliminates domestic sheep grazing, these concerns would no longer be relevant. This alternative would be the Preferred Alternative by those most concerned about maintaining bighorn herds for hunting and wildlife viewing opportunities, and those concerned about eliminating grazing conflicts in the project area.

Alternative 1 has a present net value of zero (Table 3-10). Since there would be no AUMs permitted on the Weminuche landscape, the agency would receive no revenue from grazing fees, and would incur no permit administration cost.

Alternative 2: Current Management

Continuation of the current situation would not create any further costs to operations grazing on FS lands. Outside forces, such as interest rates, fuel prices, or market conditions could change the margin of profit for any operation regardless of AUM's (Animal Unit Month) grazed on federal lands, but there would likely be no change from the current economic situation due to Forest Service action. All else equal, the regional economic contributions deriving from livestock grazing as presented in the affected environment section would likely be sustained, given current AUM usage. This alternative would be the most preferred by those stakeholders interested in maintaining FS for grazing use and those currently utilizing the project area under a grazing permit.

Under this alternative, there are 44,457 acres of overlap (acres open to grazing in bighorn core range) in active or vacant allotments. There are concerns that physical contact between bighorn sheep and domestic sheep results in an increased risk of disease transmission potential to bighorn sheep, with increased potential for a subsequent bighorn mortality event. Such social and economic impacts could potentially affect the economic activities deriving from recreation (including bighorn sheep viewing and hunting), the associated regional economic contributions to the local economy as discussed previously, as well as continued disruption to recreational users sense of place in the area. The potential future risk to bighorn sheep herds being lost to disease would continue to be of concern to those who have invested in the reintroduction and conservation of herds. Market conditions for sheep and lamb and other factors such as substitution would ultimately determine whether these potential effects actually materialize.

Since this alternative would continue domestic sheep grazing, this alternative would be the least Preferred Alternative by those concerned about maintaining bighorn herds for hunting and wildlife viewing opportunities, and those concerned about eliminating grazing conflicts with recreational use in the project area.

As shown in Table 3-10, the present net value of Alternative 2 would be -$39,163. Although Alternative 2 would bring in grazing fees revenue, the costs of permit administrative as well as cattle improvement costs (shared with permittee) required for the Canyon Creek Allotment would not be completely offset by the grazing fees revenue. It simply implies that agency income from grazing permit fees does not fully offset its costs of improvement, annual maintenance and permit administration (i.e. inspections). Grazing fees are set based on a formula established by Congress. The formula is not subject to change by the Forest Service.

Alternative 3: Adaptive Management /Forage Reserves

Alternative 3 requires allotments be managed more actively than Alternative 2 due to new Design Criteria. Because of the flexible nature of adaptive management, it is difficult to predict the impact to ranching operations. Some operators may be effective in monitoring and adjusting to adaptive management options, while others may be unable to adapt to the new conditions. As with Alternative 2, outside forces play a large role in the ability for ranchers to maintain an operation's profitability. This alternative may be preferred by some stakeholders interested in maintaining FS

for grazing use and for some currently utilizing the project area under a grazing permit that are able to effectively implement adaptive management measures.

Some ranches may not be able to adapt to the new management practices and/or profit margins could become too small to remain in business. Some ranching operations could possibly fail. See Alternative 1 for detailed discussion regarding factors affecting such business decisions. If permittees are able to adapt to the increased costs of grazing implementation and improvements, all else equal, the regional economic contributions deriving from livestock grazing under Alternative 2 would likely be sustained, given current AUM usage.

Under this alternative, there are no overlaps (acres open to grazing in bighorn core range) in active or vacant allotments. Given successful implementation of Design Criteria under this alternative, concerns regarding potential negative effects on economic activities deriving from recreation bighorn sheep viewing and hunting and associated regional economic contributions to the local economy are likely reduced. The potential future risk to bighorn sheep herds being lost to disease may continue to be of concern within the S71 herd.

This alternative would continue domestic sheep grazing within areas with recreational users mostly outside of wilderness, still creating conflict for those users with the sheep activities. This alternative would be a more Preferred Alternative than Alternative 2 by those concerned about maintaining bighorn herds for hunting and wildlife viewing opportunities, and by those concerned about eliminating grazing conflicts with recreational use in the project area, especially within the wilderness.

As shown in Table 3-10, the present net value of Alternative 3 would be -$39,163. Although Alternative 3 would bring in grazing fees revenue, the costs of permit administrative as well as cattle range improvement costs (shared with permittee) required for the Canyon Creek Allotment would not be completely offset by the grazing fees revenue. Therefore, the present net value of Alternative 3 is negatively offset by the grazing fees revenue.

Alternative 4: Adaptive Management / Vacant Allotments with Restocking Requirements

All effects and discussions for Alternative 3 would apply here, except that all vacant allotments would not be re-stocked without meeting the specific restocking requirements, instead of designating some of them as forage reserves. While those allotments have been vacant for over 3-4 decades, the restocking restrictions would technically provide less flexibility for grazing permittees because options for grazing livestock in emergency situations would be lost. Because of this loss of flexibility, this alternative is not preferred by those stakeholders interested in maintaining FS for grazing use and those currently utilizing the project area under a grazing permit.

Under this alternative, there are no overlaps (acres open to grazing in bighorn core range) in stocked allotments, and the vacant allotments would not be re-stocked without meeting the specific requirements. Given successful implementation of Design Criteria under this alternative, concerns regarding potential negative effects on economic activities deriving from recreation bighorn sheep viewing and hunting and associated regional economic contributions to the local economy are likely reduced over the long term. The potential future risk to bighorn sheep herds being lost to disease may continue to be of concern within the S71 herd.

This alternative would continue domestic sheep grazing within areas with recreational users mostly outside of wilderness, still creating conflict for those users with the sheep activities. This alternative would be a more Preferred Alternative that Alternatives 2 or 3 by those concerned about maintaining bighorn herds for hunting and wildlife viewing opportunities, and by those concerned about eliminating grazing conflicts with recreational use in the project area, especially within the wilderness.

In the financial efficiency analysis (Table 3-10), the agency revenue flow under Alternative 4 is the same as Alternatives 2 and 3, assuming similar AUM usage. Additional cattle range improvement costs incurred by the Forest Service under this alternative includes its share of costs to installing fences, construct new spring developments and stock ponds, reconstruct nonfunctional spring developments and stock ponds, and other related material costs for all allotment (except Virginia Gulch). The negative PNV simply implies that agency income from grazing permit fees does not fully offset its costs of cattle range improvements, annual maintenance and permit administration (i.e. inspections). Many of the costs and benefits associated with this alternative are not quantifiable or accurately portrayed. These costs and benefits are described qualitatively, in the individual resource sections of this EIS. Management of National Forest lands is expected to yield positive net benefits for the American public, including the consideration of all other non-market benefits and costs. These management actions, however, may or may not yield financial net revenues.

Environmental Justice

Executive Order (EO) 12898 directs federal agencies to focus attention on the human health and environmental conditions for minority and low-income populations. The purpose of EO 12898 is to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority and low-income populations.

La Plata County is not very diverse racially, compared to the state or nationally. With Ute Mountain Ute and Southern Ute reservations nearby, the American Indian population in La Plata County is higher than both the state and national averages. And ethnically, the Hispanic and Latino population is slightly higher in La Plata County (about 17 percent) than the state's average of 12 percent, but still less that the U.S. average of 21 percent. Otherwise, the county has limited diversity.

Poverty is an important indicator of economic well-being. For public land managers, understanding the extent of poverty is important for several reasons. First, people with limited income may have different needs, values, and attitudes as they relate to public lands. Second, proposed activities on public lands may need to be analyzed in the context of whether people who are economically disadvantaged could experience disproportionately high and adverse effects under EO 12898. La Plata County appears to have fewer individuals and families living under the poverty level than both the state and national averages.

While the *individual* permittees or their employees may be part of a population of concern under the EO, the overall *population* of La Plata County is neither greater than 50% minority nor greater than the county or state average of individuals living below the poverty line (*US Census Bureau 2000*). Disproportionate negative impacts on area populations are not expected. Employment and economic incentive provided to minority permittees and their typically minority herders provides a benefit to these ethnic groups.

Cumulative Impacts

Following the national trend, the dominant feature of the sheep industry in the area has been the steady decline in sheep production since the height of mid-1940s. Today, the agribusiness sector is not a major economic driver in La Plata County, sheep and lamb operations in the county; about 60 of them according to the latest Agriculture Census, will likely continue to contribute to the regional economy given market conditions. Preliminary forecast shows per capita lamb consumption in the U.S. to remain low (around 0.7 lbs. - 0.8 lbs. per capita) through year 2023.

Although currently less than 3% of La Plata County's land area is in the urban / built-up class, and that grazing is the largest class of private agricultural lands (and of relatively low value on a per acre basis); however, from the RPA land conversion study described previously, development pressure for ranch base properties is not non-existent. Furthermore, as described previously, pasture and rangeland will constitute the majority of land cover conversion projected to occur by 2060. Private open space is generally abundant in La Plata County. Should the land use of the permittee's base property change to either residential or commercial use, it will affect the immediate community; however, it would not materially affect local trends in open space.

Based on the information presented above, implementation of any alternative analyzed in this EIS would not result in substantial cumulative impacts to economic resources.

3.10 CULTURAL RESOURCES

Affected Environment

There is evidence of occupation of the analysis area from approximately 10,500 years ago to the present. During prehistoric times, the analysis area was primarily utilized on a seasonal basis for resource procurement activities such as hunting and plant gathering. This occupation is affiliated with paleoindian, archaic, and protohistoric (Ute) cultures. Evidence of historic occupation includes the remains logging, mining, ranching, and herding activities. The historic period occupation in the analysis area is affiliated with European-American, Hispanic-American, and Native-American cultures.

The analysis area for the grazing assessment is the 166,628 acres of land within the Weminuche Landscape. A review of existing San Juan National Forest and Colorado Historical Society records was conducted to identify previous incidences of archaeological survey and known historic properties within the analysis area. Thirty-eight cultural resource inventories have been completed in the analysis area within the past 30 years, resulting in approximately 4,662 acres of intensive level inventories. The previous surveys were conducted in support of recreation, prescribed burns, minor land use authorizations, and timber management.

The Colorado Historical Society's records indicate that 142 cultural resources have been identified within the analysis area. Isolated finds, cultural resource locales consisting of one or very few artifacts, account for sixty-nine of the cultural resources in the project area. The majority of sites in the general region of the analysis area consist of prehistoric sites associated with lithic reduction and seasonal camping. A smaller percentage of the cultural resources are attributed to historic natural resource exploitation in the area.

In addition to the landscape, the trailing routes to the landscape were also analyzed for impacts to cultural resources. These are primarily existing road and trail corridors that are used to bring stock to the grazing allotments and any camps that occur leading into the Weminuche landscape. The analysis area for this portion is 1,664 acres of potential effects. This includes the trail and a fifty foot buffer on either side of the trail. Fifty cultural resource inventories have been completed in the trailing area within the past 30 years, resulting in approximately 761 acres of intensive level inventories. Fifteen cultural resources are located within the trailing corridor. They are primarily associated with prehistoric resource exploitation.

Under 36 CFR 800.16(d) the Area of Potential Effects (APE) is the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The Area of Potential Effects is influenced by the scale and nature of the undertaking and may be different for different kinds of effects caused by the undertaking. Under Alternatives 2 and 3, the potential to affect historic properties would be limited to the allotments which are proposed to remain active, or are proposed for emergency use. As Colorado is a fence-out state, and very little fencing of private property is present in the analysis area, grazing does occur on private property within the active allotments. As grazing on private property is considered a connected action, non-federal lands are included in the APE.

Under Alternative 2, the APE would be those allotments that would remain active (49,174 acres). Twenty-nine cultural resource inventories have been completed in the analysis area for Alternative 2 within the past 30 years, resulting in approximately 3,291 acres of intensive level inventories.

Within the Alternative 2 APE, 54 cultural resources have been identified. Of this number, 35 are considered not eligible for the National Register of Historic Places (NRHP). Fifteen sites require additional data prior to evaluating them for the NRHP and are currently considered potentially eligible. The remaining 4 sites are eligible for the NRHP and one, the Durango to Silverton Narrow Gauge Railroad, is listed on the NRHP.

Under Alternative 3, the APE would be those allotments proposed as active and as forage reserve for either sheep or cattle (73,475 acres). Twenty-six cultural resource inventories have been completed in the APE for Alternative 3 within the past 30 years, resulting in approximately 3,146 acres of intensive level inventories. Within the Alternative 3 APE, 80 cultural resources have been identified. Of this number, 58 are considered not eligible for the National Register of Historic Places (NRHP). Nineteen sites require additional data prior to evaluating them for the NRHP and are currently considered potentially eligible. The remaining three sites are eligible for the NRHP.

Under Alternative 4, the APE would be those allotments proposed as active (45,601 acres). The vacant allotments with restocking restrictions are not considered part of this APE because more NEPA (including archeological analysis) would have to be done prior to restocking. Twenty-six cultural resource inventories have been completed in the APE for Alternative 3 within the past 30 years, resulting in approximately 3,146 acres of intensive level inventories. Within the Alternative 4 APE, 49 cultural resources have been identified. Of this number, 32 are considered not eligible for the National Register of Historic Places (NRHP). Fifteen sites require additional data prior to evaluating them for the NRHP and are currently considered potentially eligible. The remaining two sites are eligible for the NRHP.

The stock trailing APE would be the same for Alternatives 2, 3 and 4 and would consist of the trail and a fifty foot buffer on either side of the trail and any camps that occur leading into the Weminuche landscape (1,664 acres). Fifty cultural resource inventories have been completed in the trailing area within the past 30 years, resulting in approximately 761 acres of intensive level inventories. Within the trailing APE, 15 cultural resources have been identified. Of this number, 11 are considered not eligible for the National Register of Historic Places (NRHP). Three sites require additional data prior to evaluating them for the NRHP and are currently considered potentially eligible. The remaining site is eligible for the NRHP.

Compliance with Section 106 of the National Historic Preservation Act

The San Juan National Forest drafted a document titled Standard Range Rescission Strategy for Cultural Resources to provide specific direction and guidance for accomplishing the Section 106 process for open range grazing permit renewal. Consultation with the Colorado State Historic Preservation Officer on this guidance was completed on June 25, 2008 (CHS #51571).

Per the *San Juan National Forest Standard Range Rescission Strategy for Cultural Resources* (*SJNF 2008*), the focus of the analysis is known livestock congregation areas and their intersection with areas known or likely to contain cultural resources. Such locations within allotments that are currently active and proposed to remain open to sheep grazing were examined during field analysis efforts conducted for this undertaking.

The Forest rangeland management staff defined areas where livestock are known to congregate within the APE. Predictive variables for sheep concentration included known bedding areas, salting locations, water sources, and landscape choke points that contributed to severe trailing. Known herder camp locations were also considered. A computer mapping site prediction model

was run to identify areas likely to contain cultural resources. The model utilized environmental factors such as proximity to water, slope, and vegetation types. Site records, orthophotos and the SJNF suitable sheep grazing acres GIS layer were used to further refine new survey areas. Additional intensive sample survey was also planned in suitable sheep forage areas on slopes of less than 35% to assess the accuracy of the inventory strategy.

Fourteen locations on National Forest lands within the Area of Potential Effects for Alternatives 2, 3 and 4 were identified by the rangeland management staff and the archaeologist as meeting the definition of intersection areas between sheep concentration and areas known or likely to contain cultural resources. The records search indicated that most of these locations lacked previous survey and that there are no known cultural resources in these locations. The same strategy was applied to the trailing APE and nine locations were identified by the rangeland management staff and the archaeologist as meeting the definition of intersection areas between sheep concentration and areas known or likely to contain cultural resources. One was previously surveyed and the remaining eight locations were on private land. Letters were sent to private land owners on May 23, 2012 requesting permission to survey on their property. No replies giving permission were received within a month of their delivery; therefore these locations were not surveyed.

Approximately 362 acres of new survey was conducted for this analysis. Nineteen acres of new intensive survey was conducted in sheep concentration areas and herder camps that lacked previous survey and were likely to contain cultural resources. An additional 295 acres of intensive sample survey was conducted in sheep grazing areas outside of identified sheep congregation locations. Forty-nine acres of intensive survey was conducted within the trailing APE.

A cultural resource report containing survey results, National Register determinations, and grazing effects on historic properties was produced and sent to the Colorado State Historic Preservation Officer.

Environmental Consequences

The cultural resources objective of this rangeland planning on the Weminuche landscape is to protect historic properties from impacts related to the continued permitting of livestock grazing. Concentrated livestock grazing has the potential to directly affect historic properties through trampling or displacement. Overgrazing can result in a decrease in vegetation and an increase in the amount of bare soil within a site. Typical dispersed sheep grazing patterns are unlikely to impact cultural resources. Sheep congregation and overgrazing would typically occur at sheep bedgrounds. Concentrated trailing generally occurs at choke points formed by landscape features that restrict sheep movement options. Repeated livestock trailing in the same areas can form new intermittent drainages within a site. Poor sheep bedground management, repeated use of the same salting locations, and continued use the same trailing routes for moving sheep bands have the potential to impact cultural resources. Both overgrazing and livestock trailing have the potential to indirectly affect historic properties by causing or enhancing erosion within archaeological sites. Sheep herder campsites, when located on an archaeological site, can disturb site deposition and surface artifacts. Sheep herders could use wooden components of historic cultural resources for firewood.

The effects of a proposed project are taken into consideration for cultural resources that are eligible or potentially eligible for the National Register of Historic Places. Cultural resources determined to be ineligible for inclusion in the Register do not require protection, and don't warrant further

consideration of effects from the proposed project. The recording of this class of cultural resources has exhausted their data potential, and effectively mitigated any impacts that may occur to them.

Alternative 1: No Term Livestock Grazing

Since term livestock grazing would not occur under this alternative, there would be no direct impacts from sheep grazing activities to historic properties in the analysis area. There is some potential for indirect impacts associated with current grazing practices to occur short term, but these would likely cease as well. The elimination of livestock grazing should result in an increase in the abundance, distribution and vigor of plant species which would increase the amount of ground cover and soil organic matter, and decrease the amount of bare soil, which would decrease the potential for soil erosion, compaction, and runoff. This would have a generalized beneficial effect on archaeological sites. Potential impact areas as sheep bedding grounds, concentrated sheep trailing locations, and associated herder camps would be eliminated. An indirect impact from the elimination of livestock grazing is that future surveys that might be required for the authorization of structural range improvements would not be conducted, and the opportunity for that survey would be lost.

Alternative 2: Current Management

The potential for current livestock grazing practices to have direct or indirect impacts to eligible sites and potentially eligible sites located within the APE would remain the same or possibly lessen if the trend of a substantial decrease in the historic numbers of sheep grazed continues. Current grazing practices would continue to maintain problems areas on the landscape caused by poor bed ground management, repeated use of the same salting locations, and repeated sheep trailing through the same areas. Problem areas on the landscape caused by the historic grazing practices would be unlikely to improve. Allowing livestock grazing to continue under current range management would maintain the established trends in rangeland conditions. Existing abundance, distribution and vigor of plant species due to livestock grazing, along with their influence on soils, would continue in its present state. In general, where undesirable impacts are occurring to eligible or potentially eligible archaeological sites due to soil movement by rills and gullies, sheet erosion and scouring, they would likely continue. Eligible or potentially eligible archaeological sites located in areas not meeting or moving toward the desired conditions could experience downward trends in vegetative cover and soil stability, since no new improvements or livestock grazing system changes would be implemented to positively affect those conditions. Eligible or potentially eligible archaeological sites located in areas already meeting or moving towards desired conditions would likely remain in a stable condition, barring any factors that contribute to livestock concentration.

There are no additional known eligible or potentially eligible sites within identified sheep congregation areas or herder camps. No impacts to eligible or potentially sites from sheep grazing activities were observed.

Future maintenance of existing rangeland management improvements, the implementation of new improvements and grazing management activities (such as herder camp locations, heavily utilized bedding grounds and salting locations, repeated sheep trailing, and corral reconstruction) should consider potential impacts to historic properties prior to implementation.

Alternative 3: Adaptive Management /Forage Reserves

Under Alternative 3, the potential for direct and indirect impacts to eligible and potentially eligible sites located within the APE should lessen, as opposed to Alternative 2. In general, an increase in the abundance, distribution and vigor of the forage species would be likely to occur, which would increase the amount of ground cover and soil organic matter, and decrease the amount of bare soil, which would increase infiltration and decrease runoff and erosion. Those areas that currently do not meet desired conditions would have the best chance to improve conditions because of the more responsive and flexible type of livestock grazing management under this alternative. This would be a benefit for eligible or potentially eligible archaeological sites located in areas not meeting desired conditions, as they would likely trend towards a more stable condition, barring any factors that contribute to livestock concentration. The Design Criteria specific to this alternative (those in particular that address livestock bedding, trailing, salting, and herder camps) should result in a decrease of potential impacts to historic properties. As Alternative 3 would result in the closure of eight allotments and decrease use on four allotments (those changing to forage reserves instead of potentially being stocked), there should be a benefit for cultural resources in these allotments identical to that discussed under Alternative 1.

There are no additional known eligible or potentially eligible sites within identified sheep congregation areas or herder camps. No impacts to eligible or potentially eligible sites from sheep grazing activities were observed.

Future maintenance of existing rangeland management improvements, the implementation of new improvements and grazing management activities (such as herder camp locations, heavily utilized bedding grounds and salting locations, repeated sheep trailing, and corral reconstruction) should consider potential impacts to historic properties prior to implementation.

Alternative 4: Adaptive Management / Vacant Allotments with Restocking Requirements

Under Alternative 4, the potential for direct and indirect impacts to eligible and potentially eligible sites located within the APE should lessen, as opposed to Alternatives 2 and 3. In general, an increase in the abundance, distribution and vigor of the forage species would be likely to occur, which would increase the amount of ground cover and soil organic matter, and decrease the amount of bare soil, which would increase infiltration and decrease runoff and erosion. Those areas that currently do not meet desired conditions would have the best chance to improve conditions because of the more responsive and flexible type of livestock grazing management under this alternative. This would be a benefit for eligible or potentially eligible archaeological sites located in areas not meeting desired conditions, as they would likely trend towards a more stable condition, barring any factors that contribute to livestock concentration. The Design Criteria specific to this alternative (those in particular that address livestock bedding, trailing, salting, and herder camps) should result in a decrease of potential impacts to historic properties. As Alternative 4 would result in the vacant allotments not being re-stocked without meeting specific restocking requirements, including further NEPA analysis, there should be a benefit for cultural resources in these allotments practically identical to that discussed under Alternative 1.

There are no additional known eligible or potentially eligible sites within identified sheep congregation areas or herder camps. No impacts to eligible or potentially eligible sites from sheep grazing activities were observed.

Future maintenance of existing rangeland management improvements, the implementation of new improvements and grazing management activities (such as herder camp locations, heavily utilized bedding grounds and salting locations, repeated sheep trailing, and corral reconstruction) should consider potential impacts to historic properties prior to implementation.

Cumulative Impacts

Activities and actions other than livestock grazing that have occurred, or will be occurring, in the analysis area could impact cultural resources. These include recreational use, fire suppression activities, fuels reduction (mechanical and prescribed burning), and timber harvest activities. Typically, planned actions of the Forest Service such as timber harvest, trail constriction, and fuels reduction require a cultural resource clearance which would require avoidance of negative impacts to cultural resources. Fire suppression activities could disturb artifacts during fireline construction. Personal firewood gathering has the potential to remove aspen art. Illegal artifact collection occurs and can be exacerbated by increased public access. Natural or man-caused erosion could expose or wash artifacts away.

Based on the information presented above, implementation of any alternative analyzed in this EIS would not result in substantial cumulative impacts to cultural resources.

3.11 ROADLESS AREAS

Affected Environment

Unroaded and undeveloped areas provide opportunities to manage for potential wilderness areas, non-motorized and limited motorized recreation, and other commodity and amenity uses. Areas that are undeveloped or roadless in nature can serve a variety of purposes. They can be managed as research natural areas or special interest areas, used for resource production or to provide non-motorized recreation, or, if suitable, recommended as wilderness.

The Forest Service has inventoried and studied roadless areas since the 1970's. These areas are referred to and tracked today as Roadless Areas. Roadless Areas are generally defined as areas in a National Forest or National Grassland that (1) are larger than 5,000 acres (in the west) or, if smaller, contiguous to a designated wilderness or primitive area; and (2) contain no system roads; and (3) have been inventoried by the Forest Service for possible inclusion into the Wilderness Preservation System.

The previous Forest Plan identified potential roadless areas on the San Juan National Forest and generally refer to them as Roadless, Unroaded, or RARE II Areas (Roadless Area Review and Evaluation) (*SJNF1992*). Of the 24 RARE II Areas listed in the previous Forest Plan, approximately 22,227 acres of the East Animas, Florida River and Graham Park Areas are found within the analysis area. These roadless areas were not recommended for inclusion into the Wilderness Preservation System under the Forest Plan, and weren't established as wilderness or Wilderness Study Areas under the Colorado Wilderness Act of 1980. Roadless inventory was updated for the *2001 Roadless Rule (USDA 2001)*, and the areas were then referred to as Inventoried Roadless Areas. The 2001 inventory includes approximately 12,833 acres of Inventoried Roadless Areas in this analysis area; the main difference between RARE II and Inventoried Roadless Areas in this project area is that designated wilderness was excluded from the newer inventory.

Roadless inventory was then updated again in 2009 during rulemaking for the *Colorado Roadless Rule (USDA 2012*), which are referred to as Colorado Roadless Areas (CRAs). The inventory for the *Colorado Roadless Rule* took a closer look, and refined the boundary to better reflect actual conditions on the ground. Under the 2009 inventory, there are approximately 13,587 acres of the East Animas, Florida, and Weminuche Adjacent CRAs in this landscape (see Figure 1-5), of which, approximately 6,301 acres are in upper tier roadless. Upper tier roadless is a subset of CRA which provides a higher level of protection. The Colorado Roadless Rule, and its associated mapping, supersedes the 2001 Roadless Rule in the state of Colorado.

The CRA acreage is located in the south-western part of the analysis area, on portions of the Tank Creek, Canyon Creek, Burnt Timber, Endlich Mesa, and Spring Gulch Allotments. The entire Upper Tier CRA acreage is located on the Tank Creek Allotment.

The analysis area totals approximately 166,628 acres; of which 13,587 acres are roadless, 141,633 acres are in the Weminuche Wilderness, with 11,408 acres being the balance.

The Colorado Roadless Rule describes nine resources or features that are often found in, and characterize CRAs. The intent of the *Rule* is to protect these roadless characteristics:

1. High quality or undisturbed soil, water and air:
2. Sources of public drinking water;

3. Diversity of plant and animal communities;
4. Habitat for threatened , endangered, proposed, candidate and sensitive species, and for those species dependent on large, undisturbed areas of land;
5. Primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation;
6. Reference landscapes (none are identified in this analysis area);
7. Natural-appearing landscapes with high scenic quality;
8. Traditional cultural properties and sacred sites; and
9. Other locally identified unique characteristics.

Environmental Consequences

Details regarding the environmental impacts of each alternative on the nine roadless characteristics can be found in corresponding sections of *Chapter 3* of this EIS: impacts to roadless characteristics #1 and #2 can be found in *Section 3.2 Soil and Water*; impacts to roadless characteristics #3 and #4 can be found in *Sections 3.5 through 3.8* pertaining to wildlife and fisheries; impacts to roadless characteristics #5 and #7 can be found in *Section 3.4 Recreation/Wilderness;* impacts to roadless characteristics #8 can be found in *Section 3.10 Cultural Resources*; and roadless characteristics # 6 and #9 do not exist in this landscape and are therefore not discussed.

None of the alternatives would result in actions that are prohibited by the *Colorado Roadless Rule*. Prohibited actions are summarized as tree cutting, sale or removal, road construction or reconstruction, and linear constriction zones.

Alternative 1: No Term Livestock Grazing

Under the No Grazing Alternative, there would no longer be grazing authorized in this landscape. The nine roadless characteristics of CRAs would be improved by the elimination of grazing.

Alternative 2: Current Management

Alternative 2 is the current condition. Impacts to the nine roadless characteristics would remain unchanged from present. There are currently impacts from grazing occurring to soil and water in isolated locations, to recreation and scenery, and to habitat for some special status species. See relevant sections of this chapter.

Alternatives 3 and 4: Adaptive Management

Alternatives 3 and 4 would have identical impacts to the nine roadless characteristics of the CRAs. Grazing would continue within the CRAs under these alternatives; closing vacant allotments or creating forage reserves would occur in areas outside of CRAs and therefore would not affect CRAs. Alternatives 3 and 4 contain many Design Criteria and adaptive options that are not included in Alternative 2, which would help to decrease negative impacts from grazing to roadless characteristics.

Cumulative Impacts

Cumulative effects to the roadless characteristics of the CRA areas in the landscape could be contributed by past, present, or reasonably foreseeable actions or events, in addition to the impacts contributed by the Preferred Alternative. There are no other projects currently ongoing within the roadless areas, and there are no other activities planned for the CRAs at this time.

Past actions that may have contributed impacts to the roadless characteristics can be found in corresponding cumulative effects sections of *Chapter 3* of this EIS, including the Wildlife, Cultural, Recreation, and Soil/Water sections.

Based on the information presented above, implementation of any alternative analyzed in this EIS would result in non-substantial cumulative impacts to roadless characteristics.

3.12 SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (*40 CFR 1502.16*). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (*NEPA Section 101*).

Alternative 1 would not allow the short-term use of grazing and thus, would not fulfill social and economic needs, but would improve the long-term productivity at the fastest pace. Alternatives 2-4 would result in short-term uses of the forage and water for grazing animals and impacts on other resources such as recreation and wildlife; implementation of the common Design Criteria under any of these three alternatives would help promote long-term productivity by mitigating the impacts of grazing. Site-specific Design Criteria under Alternatives 3 and 4 would further address specific resource concerns and further promote long-term productivity. Of the action alternatives, Alternative 4 would best promote long-term productivity and sustainability over the greatest number of acres because the vacant allotments would not be re-stocked without meeting the specific list of requirements.

3.13 UNAVOIDABLE ADVERSE EFFECTS

As required by 40 CFR 1502.16, an environmental consequences section of the impact statement should include discussion of any adverse environmental effects which cannot be avoided should the proposal be implemented.

Under any action alternative where grazing would be authorized, there are certain unavoidable adverse effects. Adverse effects were identified in individual resource sections of this chapter, including vegetation use, spread of noxious weeds, negative impacts to the recreational experience, and possible disease transmission to bighorn sheep. Adverse effects could range from negligible to significant, depending on the resource and the alternative chosen. The Design Criteria and proposed adaptive management system would minimize these adverse effects. The Forest Service is not required to avoid all adverse effects, or to avoid all significant adverse effects.

3.14 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. *Irretrievable* commitments are those that are lost for a

period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road.

There would be no irreversible commitment of resources resulting from the implementation of any of the alternatives analyzed in this DEIS because any loss of resources would not be permanent and could be recovered over time.

Irretrievable commitments of resources would occur for a time by authorizing grazing. These would include the use of forage and impacts to other resources as described in the preceding resource sections of this chapter. These irretrievable commitments would be short-term for as long as grazing occurs; if grazing were to be removed from the landscape in the future, those resources could be recovered over time to pre-livestock conditions. Furthermore, Design Criteria and the adaptive management system proposed in the Preferred Alternative would result in the impacts (commitments) moving towards desired conditions and being reduced over time.

3.15 CUMULATIVE EFFECTS SUMMARY

Cumulative effects, or impacts, are defined as "the impact on the environment which results from the incremental impact of the [proposed] action, when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (*40 CFR 1508.7).*" In this case, cumulative effects are the impacts of implementing the proposed action of improved permitted term livestock grazing on the natural resources, added to impacts from other actions on those same resources. Previously in this chapter, cumulative effects on each resource area were discussed in more detail. Natural or global-scale events are usually not considered Cumulative Effects because they are not management actions, but some are worth mentioning because their consequences have impacts on the environment and could be interrelated with grazing. See *Section 3.16*.

Because most of the analysis area is in wilderness, there are not many past, present, or reasonable foreseeable management activities that would contribute cumulatively to impacts caused by grazing. Other management activities in the wilderness are primarily limited to trail maintenance and issuance of outfitter-guide permits. These activities are limited in acreage and have limited resource effects.

Management activities other than grazing, outside of the wilderness in this landscape, have been primarily timber and vegetation management actions. These have occurred several decades in the past, and impacts have mostly reached the point of stabilization and are not contributing greatly to cumulative effects on the resources. There are no future vegetation treatments proposed in the landscape at this time.

Increasing recreational demands will be one of the major factors affecting this landscape into the future. These demands may lead the FS to implement different types of regulations, both inside and outside of wilderness. For example, travel management decisions could change the distribution of types of recreational uses outside of wilderness, or a mandatory wilderness permit system could change the intensity of recreational use in the wilderness. High recreational use could contribute cumulatively to grazing impacts on resources such as soils, watershed, wildlife, and vegetation.

3.16 NATURAL AND LARGE-SCALE EFFECTS

Events and circumstances beyond the control of the San Juan National Forest have a much greater possibility of creating substantial environmental effects in this landscape than intentional management actions, especially since the majority of this landscape is in wilderness. Natural and large-scale disturbances including wildfire, wind events, landslides, floods, drought, insect and disease outbreaks, and climate change can have enormous influences on environmental systems. These types of events contribute to changes in the composition and structure of the vegetation and to changes in hydrologic functions, which in turn, could impact grazing suitability, wildlife habitat, watershed conditions, and other resources. These types of events can also interact with each other to compound the effects.

Fire

Approximately 5,600 acres of the analysis area was burned by the 2002 Missionary Ridge Fire. This effected vegetation composition and succession of most of the Spring Gulch and Burnt Timber Allotments as well as small portions of the Fall Creek and Cave Basin Allotments. Root crowns and underground rhizomes of many grass species are able to tolerate and survive fire. Seeds of forbs and shrubs may also be released by a fire occurrence. Gambel oak and aspen were common species in the burned areas and both species are prolific re-sprouters following a moderate to high intensity fire. Areas that had a component of oak and aspen within a conifer forest, like in the Spring Gulch Allotment, have succeeded post-fire to a mostly aspen-oak-forb composition. In areas that were pure conifer stands and burned at a higher intensity, forbs and shrubs are now the dominant cover. Pure conifer stands are fairly slow to regenerate without seeding or planting although some natural conifer regeneration has been seen within the burned area. In much of the burned area, range suitability increased. Because of the fire, a drastic reduction of the ground cover component along with hydrophobic and/or erosive soils within the landscape diminished hydrologic form and function in a number of drainages within the analysis area. Large-scale scouring and erosion events followed the fire for several years, requiring that livestock from some burned areas were temporarily moved to other available grazing areas. Future fires could have similar results.

Insect and Disease

Perhaps the greatest current and near-future (5- to 10-years) influence on resource conditions in the Weminuche Landscape is a spruce beetle (*Dendroctonus rufipennis*) epidemic that is rapidly expanding from northern and eastern portions of the landscape towards southern and western portions of the landscape. Large stands of Engelmann spruce has either died or is dying, causing extensive openings in the overstory forest canopy. For example, within the past five years, the upper third of the Pine River and Vallecito Creek drainages have had extensive areas of mortality of mature Engelmann spruce trees, in some areas exceeding 80% to 90% of mature overstory trees. Within stands affected by spruce beetles, there is a high probability that most spruce trees over five inches diameter will die. Within the next five years the beetle outbreak is expected to expand down the Pine River and Vallecito Creek drainages, and is expected to increase in the upper Florida River and Missionary Ridge portions of the Weminuche Landscape.

Predicted mortality in these high-elevation forests could affect the analysis area in the short-term by increasing the amount of fine fuels on the forest floor therefore increasing the probability of a

fire starting. In the long-term, die-off in the spruce-fir could increase the amount of dead and downed timber on the forest floor therefore increase fire intensity, frequency and duration. In the long-term, high tree mortality would decrease the canopy cover and could have implications on hydrologic features that occur in closed-canopy spruce-fir forests. Mass tree mortality in our forests could change plant species composition and diversity within these areas, result in increased understory drying, or result in seasonal shifts in snowmelt, green-up, or output of springs.

The beetle epidemic has the potential to substantially alter habitat conditions for many wildlife species, although there is much uncertainty about the degree of these impacts. For example, beetle-induced spruce mortality may impact the habitat capability of the Threatened Canada lynx by affecting the habitat of their primary prey species. Wide spread spruce mortality could result in reducing forage value for species such as American marten, and could increase the habitat value for cavity-nesting species. Forage value for bighorn sheep could be improved by the beetle epidemic because mortality of overstory trees is expected to open the canopy of previously closed-canopy spruce stands, allowing increases in forage production in the understory. In addition, bighorn mobility across the landscape may be improved.

Climate Change

The interactions between vegetation, warming temperatures and change in precipitation are complex, so impacts to plant communities due to changing climate are variable and difficult to predict. However, we know that temperatures in the southwest have increased two degrees Fahrenheit over the past 30 years and that additional warming is predicted (*Western Water Assessment 2008*). Research shows a change in alpine ecosystems, with the earlier onset of spring snowmelt, warmer temperatures, and the upward encroachment of tree and subalpine plant species (*Clow 2007; Moir 1999; Crawford in review*). Plant response could be highly species-specific, which suggests current plant communities may not simply move to new landscape positions, but may be replaced by new plant assemblages. Climate change may also exaggerate the infestations of insects and disease in high-elevation forests increasing tree mortality and effecting plant composition.

Climate change may favor many invasive species that can outcompete and displace native species. This decreases the desirable forage plants and decreases overall plant diversity and resiliency of plant communities. The addition of the potential for continued drought combined with a higher frequency of high-intensity wildfires would likely provide increased opportunities for annual weed spread and establishment.

Climate change has the potential to reduce the available habitat for some fish species, including the Colorado River cutthroat trout, by increasing stream temperatures or increasing the likelihood of other disturbances such as flooding or wildfire over time. Increased stream temperatures may limit cold-water species to shorter stream reached at higher elevations, while benefitting other fish species at the lower elevations. Other disturbances such as insect outbreaks or wildfire may impact all fish populations as they occur. The magnitude of effects from natural and large-scale disturbances to influence fish populations is unknown.

Climate change is a contentious issue with a great deal of uncertainty about what likely outcomes might be. However, there is little doubt that plants and animals found exclusively in the alpine zone may be the first to decline or face shrinking habitat areas as a result of changes in global climate. Most predictions about global climate change predict a gradual loss of alpine habitats as

treelines move upward, alpine snow packs are reduced, and late-spring snow fields recede. These changes may reduce habitat capability for snow-dependent alpine species. The effect of climate change has the potential to have far greater consequences than the combined effects of grazing, recreation, mining, and other human impacts to alpine species.

The combination of growing recreational use, continuing drought, warming temperatures, and increasing tree mortality have the potential to negatively affect watershed function, stability and resilience. Snowpack accumulation patterns and melt timing, along with precipitation event intensity and timing have a direct effect on water yields and ground/surface water interactions. This may negatively impact highly-dependent sensitive springs, seeps, wetlands, fens and high alpine lakes found throughout the analysis area. Because climate change is also hydrologic change there is particular concern that some specialized and small-scale ecosystems within the analysis area may be adversely affected. These are seasonal springs, seeps, small ponds, wetlands and fens all of which occur in the analysis area and many of which house a diverse array of plants including some Forest Service sensitive species.

Implications for Grazing

The degree and speed of these kinds of natural and large-scale events are highly uncertain and unpredictable, making planning into the future difficult. The kinds of impacts described in this section could alter the acreage and distribution of suitable grazing lands. The carrying capacity is also likely to change and become more variable overall, but the degree and rate of change is unknown (*Furniss 2010*).

It is assumed that decreased tree cover would result in increased grass and forb production, which could expand not only the number of livestock that could be supported, but could also expand the acreage that would be determined to be suitable for grazing.

If vegetation types and species are altered over the long-term, impacts from grazing could be reflected differently than current impacts. Different plant species may react differently to grazing pressure. Locations and functionality of seeps, springs, and wetlands could also change, and could be impacted by livestock differently than today. Shifts in vegetation could change how animals use the landscape and could increase the potential for bighorn and domestic sheep to come in contact with each other. Other unforeseen changes could occur in how livestock grazing impacts the landscape and would be managed.

The degree to which these potential changes might occur is unknown. For the time being, decisions regarding land management, including those regarding permitted term grazing permits, are made based on current conditions; but future management decisions will likely be needed in order to adjust to these kinds of changed conditions, when and if they occur.

CHAPTER 4 - CONSULTATION AND COORDINATION

4.1 PREPARERS

The following Forest Service personnel were primarily responsible for the preparation of this document:
Jared Whitmer – Project Leader, Range Staff
Cam Hooley – Environmental Coordinator
Chris Schultz – Wildlife Biologist
Jed Botsford – Recreation Staff
Eric Herchmer – Hydrologist
Beth Jones – Ecologist/Botanist
Clay Kampf – Fisheries Biologist
Lynn Robinson – Archeologist
Jessey Ramirez – GIS Specialist
Kawa Ng – Economist
Julie Schaefers – Social Scientist

4.2 CONTRIBUTION TO THE DEIS

The Forest Service informed, consulted with, or received input from the following Federal, State, and local agencies, tribes, organizations, and individuals during the development of this DEIS:

Federal, State, and Local Agencies:

City of Durango
Colorado Department of Agriculture
Colorado Parks and Wildlife
Colorado State Historic Preservation Officer
Colorado State Land Board
Hinsdale County, Colorado
La Plata County, Colorado
San Juan County, Colorado
US Congress Senator Bennet
US Congress Representative Tipton
USDA Agricultural Research Service
USDA Rio Grande National Forest, Divide Ranger District
USDA Uncompahgre National Forest, Ouray Ranger District
USDI Environmental Protection Agency
USDI Fish and Wildlife Service

Tribes:

Hopi Tribe
Jicarilla Apache Nation
Navajo Nation
Northern Ute Tribe
Ohkay Owinge
Pueblo of Acoma
Pueblo de Cochiti
Pueblo of Isleta
Pueblo of Jemez
Pueblo of Laguna
Pueblo of Nambe
Pueblo of Picuris
Pueblo of Pojoaque
Pueblo of Sandia
Pueblo of San Felipe
Pueblo of San Ildefonso
Pueblo of Santa Ana
Pueblo of Santa Clara
Pueblo of Santo Domingo
Pueblo of Taos
Pueblo of Tesuque
Pueblo of Zia
Southern Ute Indian Tribe
Ute Mountain Ute Tribe
Zuni Pueblo

Others:

Various interested individuals
Various livestock permittees
Various permitted outfitters
American Sheep Industry Association
Backcountry Hunters and Anglers
Club 20
Colorado Trail Foundation
Colorado Wildlife Federation
Colorado Wool Growers Association
Four Corners Native Plant Society
Great Old Broads for Wilderness
La Plata-Archuleta Cattlemen's Association
National Legal and Policy Center
National Wildlife Federation
Rocky Mountain Bighorn Society
San Juan Citizen's Alliance
San Juan Woolgrowers Association
Utah State University
Western Watersheds Project
Wild Sheep Foundation
WildEarth Guardians
Wyoming Department of Agriculture

4.3 DISTRIBUTION OF THE DEIS

The following agencies, organizations, and individuals were sent a copy or notified of the availability of the DEIS; the list includes those who specifically requested a copy of this document or who provided input during the development of this DEIS. The DEIS may be obtained on-line at *http://www.fs.usda.gov/project/?project=37578* .

Table 4-1. Distribution List for the DEIS

Affiliation, Agency, or Organization	Last Name	First Name
Adventures Beyond	Palmer	Randy
Advisory Council on Historic Preservation		
Agricultural Research Service	Highland	Maggie
Agricultural Research Service	Knowles	Don
Agricultural Research Service	Thacker	Eileen
American Sheep Industry Association	Krebs	Clint
Animal and Plant Health Inspection Service		
Backcountry Hunters and Anglers	Brass	Timothy
Backcountry Hunters and Anglers	Lien	David
Chief of Naval Operations, Energy & Environmental Readiness Division		
Club 20	Petersen	Bonnie
Colorado Backcountry Hunters & Anglers	Marion	Bob
Colorado Parks and Wildlife	Thorpe	Matt
Colorado Trail Foundation	Eads	Larry
Colorado Trail Foundation	Lipe	John
Colorado Wildlife Federation	O'Neill	Suzanne
Colorado Woolgrowers Association	Brown	Bonnie
Dept. of Energy, NEPA Policy & Compliance		
Federal Aviation Administration, NW Mt. Region		
Federal Highway Administration		
Four Corners Native Plant Society	Schneider	Al
Grazing Permittee: Bear Creek West & Canyon Creek Allotments	Bandy	Paul
Grazing Permittee: Burnt Timber, Endlich Mesa, Spring Gulch, Tank Creek, & Virginia Gulch Allotments	Brown	J. Paul
Grazing Permittee: Vallecito & Lion Creek Allotments	Decker	Kennon
Great Old Broads for Wilderness	Silbert	Shelley
Hinsdale County	Davis	Paula
Hopi Tribe		
Jicarilla Apache Nation		
La Plata County		
La Plata-Archuleta Cattlemen's Assoc.	Semler	Wayne
National Agricultural Library		
National Legal and Policy Center	Boehm	Kenneth
National Resource Conservation Service		
National Wildlife Federation	Gale	John
Navajo Nation		
Northern Ute Tribe		
Office of Environmental Policy & Compliance		
Ohkay Owinge		
Pueblo de Cochiti		
Pueblo of Acoma		
Pueblo of Isleta		
Pueblo of Jemez		
Pueblo of Laguna		
Pueblo of Nambe		
Pueblo of Picuris		
Pueblo of Pojoaque		
Pueblo of San Felipe		
Pueblo of San Ildefonso		
Pueblo of Sandia		
Pueblo of Santa Ana		
Pueblo of Santa Clara		

Affiliation, Agency, or Organization	Last Name	First Name
Pueblo of Santo Domingo		
Pueblo of Taos		
Pueblo of Tesuque		
Pueblo of Zia		
Rocky Mountain Bighorn Society	Meyers	Terry
San Juan Citizens Alliance	Buickerood	Jimbo
San Juan County		
San Juan Woolgrowers	Taylor	Lorraine
San Juan Woolgrowers Assoc.	Naegle	Robert
Seventy Seven Outfit	Young	Sandy
Southern Ute Indian Tribe	Johnson	Aran
Southern Ute Indian Tribe		
State of Colorado	Broscheid	Bob
U.S. Army Corps of Engineers, NW Division		
U.S. Army Corps of Engineers, S Pacific Division		
U.S. Coast Guard, Office of Environmental Management		
U.S. Congress, Representative	Tipton	Scott
U.S. Congress, Senator	Bennet	Michael
US EPA, Region 8		
USFS GMUG National Forest	Liston	Kelly
USFS Rio Grande National Forest	Malecek	Tom
USFS Rio Grande National Forest	Post	Tristram
Utah State University	McNeal	Lyle
Ute Mountain Ute Tribe		
Vallecito Lake Outfitters	Schilthuis	Denny
Western Watersheds Project	Ratner	Jonathan
Wild Sheep Foundation	Hurley	Kevin
WildEarth Guardians	Dyson	Greg
Wyoming Dept. of Agriculture	McDonald	Michelle
Zuni Pueblo		
	Allen	Jon
	Ancel	Nadine
	Annala	Loretta
	Aspelund	Jason
	Beaber	Paul
	Belles	Mark
	Berry	Nancy
	Bickel	Bettina
	Bickel	Jean
	Boland	Diana
	Boutilier	Elaine
	Branner	Klemens
	Brown	Jean
	Bruning	Don
	Byrne	Gene
	Coburn	Lynn
	Colt	Lori
	Dahm	Mary Anna
	Davis	Paul
	Delanoy	Katherine
	DeVeny	Maureen
	DeWitz	Ron
	Dvergsten	Cindy
	Eaton	Wesley
	Egan	Veronica
	Ellis	Corey
	Fetchenhier	Scott
	Gendron	Joseph
	Gilbert	Sue Ellen
	Graham	Judy
	Grenoble	David
	Hann	Michael
	Hanstedt	Steve
	Hardesty	Rick

Affiliation, Agency, or Organization	Last Name	First Name
	Hobbs	Will
	Hronich	Larry
	Huggins	Ryan
	Iverson	Paul
	Jarrell-King	Veronique
	Jefferies	Ned
	Jefferies	Wayne
	Jensen	Mike
	Johnson	Heather
	Jones	Dale
	Jones	Kevin
	Juracka	Kathy
	Kappelman	John
	Kenna	Matt
	Kimmel	Brian
	King	Janet
	Kuhnert	Bob
	Lanzen	Lee
	Lasater	Jesse
	Lasater	Houston
	Lee	Robert C.
	Maddox	Darrell
	McClintock	Amy
	McCord	Marilyn
	McQuarie	Donald
	Moore	Sally
	Morrison	Kim
	Mumma	John
	Musgrave	Chris
	Nelson	Jeff
	Nelson	Jeff
	Nelson	MaryAnne
	Newman	Joseph
	Ong	Robert
	Paden	Nathan
	Pansze	Trent
	Parkinson	Dan
	Pavlick	Steve
	Pearson	Mark
	Petersen	David
	Pitts	James
	Rankin	Holly
	Reynolds	Jeff
	Robinson	Collin
	Rowland	Peter
	Sanchez	Leslie
	Schwarz	Ann
	Sims	Gary
	Skiba	Gary
	Sobal	Tom
	Sykes	Tom
	Taylor	Kent
	Tobin	Dan
	Traina	Valerie
	Wales	Charles
	Warren	Greg
	Waslien	Randy
	Watson	Adrian
	Young	James

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Please note that this document is searchable in electronic format by word or term; for this reason, this index is not exhaustive.

APPENDIX A - ACRONYMS AND GLOSSARY

AMP – Allotment Management Plan

AOI – Annual Operating Instructions

APE – Area of Potential Effect (for cultural resources)

AUM – Animal Unit Month

BA – Biological Assessment (for Threatened and Endangered Species)

BE – Biological Evaluation (for Sensitive Species)

BMP – Best Management Practices, called Design Criteria in this document

CFR – Code of Federal Regulations

CHHR – Core Herd Home Range for Bighorn Sheep

CPW – Colorado Parks and Wildlife

CRA – Colorado Roadless Area

DEIS – Draft Environmental Impact Statement

EA – Environmental Assessment

EIS – Environmental Impact Statement

ESA – Endangered Species Act

FEIS – Final Environmental Impact Statement

FS – Forest Service

FSH – Forest Service Handbook

FSM – Forest Service Manual

GIS – Geographic Information System

MIS – Management Indicator Species (wildlife)

NEPA – National Environmental Policy Act

N.M.P.M. – New Mexico Principal Meridian

NRHP – National Register of Historic Places (for cultural)

OHV – Off Highway Vehicle (ATVs, motorcycles, and other unlicensed motor vehicles)

PFC – Proper Functioning Condition (for riparian areas)

RHM – Rangeland Health Matrix Evaluation

SJNF – San Juan National Forest

USFS – United States Forest Service

USFWS – United States Fish and Wildlife Service

APPENDIX B - CITATIONS AND REFERENCES

36 CFR 218. 2013. Project-Level Predecisional Administrative Review Process. Federal Register, Vol. 78, No. 59. March 27, 2013.

36 CFR 222. 2012. Range Management, Subpart A; Grazing and Livestock Use on the National Forest System.

40 CFR 1500. 1986. CEQ Regulations for the National Environmental Policy Act.

American Sheep Industry Association (ASIA). 2011. Bighorn working session recommendations, June 14, 2011. Unpublished document. 2 pp. Available on the internet at: *http://amhealthmaster.http.internapcdn.net/AMHealthMaster/DOCUMENT/SheepUSA/bighorn_working_sessions.pdf*

Aubry, K. B., K. S. McKelvey, and J. P. Copeland. 2007. Distribution and broadscale habitat relations of the wolverine in the contiguous United States. J. Wildl. Manage. 71:2147-2158.

Aune, K., N. Anderson, D. Worley, L. Stackhouse, J. Henderson, J. Daniel. 1998. A comparison of population and health histories among seven Montana bighorn sheep populations. Proc. Bienn. Symp. North. Wild Sheep and Goat Counc. 11:46-69.

Banci, V. 1994. Wolverine. Pages 99-127 in the scientific basis for conserving carnivores, American marten, fisher, lynx, and wolverine in the western United States. L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, tech. eds. USDA For. Serv. Gen. Tech. Rep. RM-254. Fort Collins, CO.

Bartlett, E. T., Torell, L. A., Rimbey, N. R., Van Tassell, L. W., McCollum, D. W. 2002. Journal of Rangeland Management. 55:426-438. September 2002.

Beecham, J. J., C. P. Collins, and T. D. Reynolds. 2007. Rocky Mountain bighorn sheep (ovis canadensis): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. Available at *http://www.fs.fed.us/r2/projects/scp/assessments/rockymountainbighornsheep.pdf.*

Besser, T. E., et.al. 2012a. Survival of bighorn sheep (Ovis canadensis) commingled with domestic sheep (Ovis aries) in the absence of Mycoplasma ovipneumoniae. Journal of Wildlife Diseases 48:168-172.

Besser, T. E., et.al. 2012b. Causes of pneumonia epizootics among bighorn sheep, Western United States, 2008-2010. Emerging Infectious Diseases 18:406-414.

Besser, T. E., et.al. 2012c. Bighorn sheep pneumonia: sorting out the cause of a polymicrobial disease. Preventive Veterniary Medicine 108:85-93.

Besser, T. E., et.al. 2012d. Survival of bighorn sheep (*Ovis canadensis*) commingled with domestic sheep (*Ovis aries*) in the absence of *Mycoplasma ovipneumoniae*. Journal of Wildlife Diseases 48:000-000.

Besser, T. E. 2013. Whodunit: what causes pneumonia outbreaks in bighorn sheep? Wild Sheep: Fall 2013.

Bradford, D., Reed, F., Baird LeValley, R., Campbell, C., Kossler, S. 2002. Livestock grazing on the National Forests: Why continue to do it? Ranglands. Vol. 24, no. 2 (April 2002): p. 3-11.

Braun, C.E. 1971. Habitat requirements of Colorado white-tailed ptarmigan. Proceedings of the Western Association of State Game and Fish Commissioners 51:284-292.

Braun, C. E., R. W. Hoffman, and G. E. Rogers. 1976. Wintering areas and winter ecology of white-tailed ptarmigan in Colorado. Colorado Division of Wildlife Spec. Rep. No. 38. W-R-S-38-’76. Denver, CO. 35 pp.

Broscheid, Bob, and John Salazar. 2014. Weminuche Landscape Grazing Analysis Environmental Assessment. Joint comment letter from CPW and CO Dept Agric. 16 July 2014.

Buskirk, S. W., and L. F. Ruggiero. 1994. American marten. Pages 7-37 in The scientific basis for conserving carnivores, American marten, fisher, lynx, and wolverine in the western United States. L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, tech. eds. USDA For. Serv. Gen. Tech. Rep. RM-254. Fort Collins, CO.

Cahn, M. L., et.al. 2011. Disease, population viability, and recovery of endangered Sierra Nevada bighorn sheep. Journal of Wildlife Management 75:1753-1766.

Carpenter, T. E., V. L. Coggins, C. McCarthy, C. S. O'Brien, J. M. O'Brien, and J. J. Schommer. 2014. A spatial risk assessment of bighorn sheep extirpation by grazing domestic sheep on public lands. Preventive Veterniary Medicine 114:3-10.

Cassirer, E. F., R. K. Plowright, K. R. Manlove, P. C. Cross, A. P. Dobson, K. A. Potter, and P. J. Hudson. 2013. Spatio-temporal dynamics of pneumonia in bighorn sheep. Journal of Animal Ecology 82:518-528.

CAST. 2008. Pasteurellosis transmissino risks between domestic and wild sheep. CAST Commentary QTA 2008-1. Council for Agricultural Science and Technology, Aimes, IA. 8 pp.

Clow, D.W. 2007. Changes in the Timing of Snowmelt and Streamflow in Colorado: A Response to Recent Warming. Journal of Climate, V. 23, pp. 2293 – 2306.

Colorado Department of Local Affairs (CODOLA). 2011. Program Description of Location Economic Information and Forecasting Assistance. State Demography Office, Department of Local Affairs, State of Colorado.

Colorado Department of Local Affairs (CODOLA). 2012. Region 9 Socioeconomic Profile. State Demography Office, Department of Local Affairs, State of Colorado.

Colorado Department of Local Affairs (CODOLA). 2013. Economic Base Analysis – La Plata County. State Demography Office, Department of Local Affairs, State of Colorado.

Colorado Department of Local Affairs (CODOLA). 2014a. Colorado Economic Update. State Demography Office, Department of Local Affairs, State of Colorado.

Colorado Department of Public Health and Environment (CDPHE). 2011. Water Quality Control Commission Regulations. Surface Water Quality Classifications and Standards. Regulation 34-Classifications and Numeric Standards for San Juan River and Dolores River Basins. Amended 6/13/2011.

Colorado Department of Public Health and Environment (CDPHE). 2012. Water Quality Control Division. Section 303(d) Listing Methodology. 2012 Listing Cycle.

Colorado Parks and Wildlife. 2015. Threatened and endangered list, available on the world wide web at: *http://cpw.state.co.us/learn/Pages/SOC-ThreatenedEndangeredList.aspx*. Accessed 10/16/2015.

Colorado Parks and Wildlife (CPW). 2015b. 2013 Rocky Mountain Bighorn Sheep Licenses, Hunters, Harvest & Recreation Days for All Manners of Take. Accessed Feb 5th 2015 at: *http://cpw.state.co.us/thingstodo/Pages/ Statistics.aspx#rockymountainbighornsheep*

Cooper, D.J. and E.C. Wolf. 2006. Fens of the Sierra Nevada, California. Final Report to the USDA Forest Service. pp. 47.

Copeland, J. P. 1996. Biology of the wolverine in central Idaho. M. S. Thesis, Univ. Idaho, Moscow, ID. 138 pp.

Copeland, J. P., et.al. 2010. The bioclimatic envelope of the wolverine (*Gulo gulo*): do climatic constraints limit its geographic distribution? Can. J. Zool. 88:233-246.Crawford, J.A. and K.

Nydick. In review. Sensitivity of the alpine flora of the San Juan Mountains, Colorado to Climate Change.

Dean Runyan Associates. 2014. The economic impact of travel on Colorado 1996-2013, prepared for the Colorado Tourism Office, Office of Economic Development and International Trade, Denver, Colorado.

Drew, M. L., K. M. Rudolph, A. C. S. Ward, and G. C. Weiser. 2014. Health status and microbial (Pasteurellaceae) flora of free-ranging bighorn sheep following contact with domestic ruminants. Wildlife Society Bulletin 38:332-340.

DuBois, C. 1903. Report on the proposed San Juan Forest Reserve, Colorado. Unpublished Report on file at the supervisor's office of the San Juan National Forest, Durango, CO.

Dunford, E.G. 1954. Surface runoff and erosion from pine grasslands of the CO Front Range. Journal of Forestry 52:923-927.

EPA. 1987. Nonpoint Source Controls and Water Quality Standards. Environmental Protection Agency. Memo #NPS: FY-87-49. August 19, 1987.

EPA. 2006. Stream Classifications and Water Quality Standards. Environmental Protection Agency. Region 9. Online at: *http://water.epa.gov/scitech/swguidance/standards/wqslibrary/upload/2006_06_26_standards_wqslibrary_ co_reg34tables-200606.pdf*

EPA. 2013. National Rivers and Streams Assessment 2008-2009. Environmental Protection Agency. Pages 85-87. *http://water.epa.gov/type/rsl/monitoring/riverssurvey/upload/NRSA0809_Report_Final_508Compliant_130228.pdf*

EPS-HDT. 2012a. Economic Profile System-Human Dimensions Toolkit. A Profile of Demographics, La Plata County. May 3, 2012.

EPS-HDT. 2012b. Economic Profile System-Human Dimensions Toolkit. A Profile of Demographics, State of Colorado. June 19, 2012.

Executive Order 12898. 1994. Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.

Forsling, C.L. 1931. A study of the influence of herbaceous plant cover on surface runoff and soil erosion in relation to grazing on the Wasatch Plateau in Utah. Tech Bulletin 220, USDA.

FSH 1909.15. 2012. National Environmental Policy Handbook. USDA Forest Service.

FSH 2209.13. 2005. Grazing Permit Administration Handbook. USDA Forest Service.

FSH 2509.25. 2006. Watershed Conservation Practices Handbook. USDA Forest Service, Rocky Mountain Region. *http://www.fs.fed.us/cgi-bin/Directives/get_dirs/ fsh?2509.25*

FSM 2200. 2005. Range Management Handbook. USDA Forest Service.

FSM 2323.2. 2007. Wilderness Management of Range. USDA Forest Service WO AMENDMENT 2300-2007-1.

FSM 2670. 2005. Threatened, Endangered and Sensitive Plants and Animals. USDA Forest Service.

Furniss, Michael J. et al. 2010. Water, climate change, and forests: watershed stewardship for a changing climate. General Technical Report PNW-GTR-812. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 75 p.

Gary, H.L., S.R. Johnson, and S.L. Ponce. 1983. Cattle grazing impact on surface water quality in a Colorado Front Range stream. Journal of Soil Water Conservation. 38:124-128.

Gentner, B. and J.A. Tanaka. 2002. Classifying Federal Public Land Grazing Permittees. Journal of Range Management 55(1):2-11.

George, J. L., R. Kahn, M. W. Miller, and B. Watkins. 2008. Colorado Bighorn Sheep Management Plan 2008 – 2018. Colorado Division of Wildlife, 6060 Broadway, Denver, CO, 80216. 96 pp.

George, J. L., R. Kahn, M.W. Miller, and B. Watkins. 2009. Colorado Bighorn Sheep Management Plan 2009 – 2019. Colorado Division of Wildlife Special Report 81. Colorado Division of Wildlife, 6060 Broadway, Denver, CO, 80216. 88 pp.

Heitschmidt and Stuth. 1991. Grazing Management - An Ecological Perspective, Timber Press Inc.

Hirsch, C.L., M.R. Dare, and S.E. Albeke. 2013. Range-wide status of Colorado River Cutthroat trout (*Oncorhynchus clarkii pleuriticus*): 2010. Colorado River Cutthroat Trout Conservation Team Report. Colorado Parks and Wildlife, Fort Collins.

Hoffman, R. W. 2006. White-tailed ptarmigan (*Lagopus leucura*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. Available on line at: *http://www.fs.fed.us/r2/projects/scp/assessments/ whitetailedptarmigan.pdf*

Hubbard, R.K., Newton, G.L., and Hill, G.M. 2004. Water quality and the grazing animal. Journal of Animal Science. 82:E255-E263.

Inman, R. M., M. L. Pakila, K. H. Inman, B. Aber, R. Spence, and D. McCauley. 2009. Greater Yellowstone wolverine program, progress report – 2009. Wildlife Conservation Society, North American Program, general report, Bozeman, MT. 32 pp.

Jacobs, James S., Michael F. Carpinelli, and Roger L. Sheley. 1999. Revegetating NoxiousWeed-Infested Rangeland in Biology and Management of Noxious Rangeland Weeds. Oregon State University Press, Corvallis.

Johnes, P., Moss, B., and Phillips G. 1996. The determination of total nitrogen and total phosphorous concentrations in fresh waters from land use, stock headage, and population data: testing of a model for use in conservation and water quality management. *Freshwater Biology* 36(2): 451-473.

Jones, Beth and Sara Brinton. 2015. Biological Evaluation for Threatened, Endangered, Proposed and Sensitive Plants, Weminuche Landscape Grazing Analysis. Columbine Ranger District. 25pp.

Kampf, Clay. 2015. Biological Evaluation for San Juan National Forest Aquatic Sensitive Species and Management Indicator Species. Weminuche Landscape Grazing Analysis. Columbine Ranger District. 19pp.

Larison, J. R., G. E. Likens, J. W. Fitzpatrick, and J. G. Crock. 2000. Cadmium toxicity among wildlife in the Colorado Rocky Mountains. Nature 406:181-183.

Larson, J. 2012. Revised BLM Grazing Impacts Methodology. Social Science Program, Bureau of Land Management, United States Department of the Interior.

Lawrence, P. K., et. al. 2010. Transmission of Mannheimia haemolytica from domestic sheep (Ovis aries) to bighorn sheep (Ovis canadensis): unequivocal demonstration with green flourescent protein-tagged organisms. Journal of Wildlife Diseases 46:706-717.

Levy, Loyd. 2008. La Plata County Economic Drivers – Job Generation by second homes and other economic drivers. Region 9 Economic Development District of Southwest Colorado, Inc. Lloyd Levy Consulting LLC.

Lovekin, Jonathan R., Satre, Michael J., Sheriff, William M., and Sares, Matthew A. 1997. USFS-Abandoned Mine Land Inventory Project Final Summary Report for the San Juan National Forest.

Lull, H.W. 1959. Soil compaction on forest and range lands. Miscellaneous publication 769, USDA.

Madrid, Anthony. 2015. Personal communications with Anthony Madrid, Renewable Resources Staff Officer, San Juan National Forest, Durango, CO.

Magnan, Nick. 2004. The Economic Base of La Plata County, Colorado. Economic Development Report. Dept. or Agriculture and Resource Economics, CSU, Fort Collins, CO. June 2004-EDR 04-04.

Magoun, A. J., and J. P. Copeland. 1998. Characteristics of wolverine reproductive den sites. J. Wildl. Manage. 62:1313-1320.

Manfredo, Michael J., Vaske, Jerry J., Bruyere, Brett L., Field, Donald R. and Brown, Perry J. 2004. Society and Natural Resources. A summary of knowledge; prepared for the 10th International Symposium on Society and Resource Management. pp. 361.

Martin, K.D., T.J. Schommer, and V.L. Coggins. 1996. Literature review regarding the compatibility between bighorn and domestic sheep. Proc. Bienn. Symp. North. Wild Sheep and Goat Counc. 10:72-77.

Miller, M. W. 2011. Update on bighorn sheep vaccines. Unpublished document. 8 pp. Available on the internet at: *http://amhealthmaster.http.internapcdn.net/AMHealthMaster/DOCUMENT/SheepUSA/update-on-bighorn-sheep.pdf*

Moir, W.H., S. Rochelle, A. Schoettle. 1999. Microscale Patterns of Tree Establishment NearUpper Treeline, Snowy Range, Wyoming. Arctic, Antarctic, and Alpine Research 31(4): 379 – 388.

MOU. 2013. Memorandum of Understanding for Management of Domestic Sheep and Bighorn Sheep. USDA Forest Service R2, USDI BLM CO, CO Dept. of Agriculture, CO Woolgrowers Assoc., and CO Division of Wildlife. Oct. 2013. 4pp.

Musselman, Robert C. and Slauson, William L. 2004. Water chemistry of high elevation Colorado wilderness lakes. Biogeochemistry 71: 387-414.

National Research Council (NRC). 2008. Changes in the Sheep Industry in the United States: Making the Transition from Tradition. Committee on the Economic Development and Current Status of the Sheep Industry in the United States, National Research Council, National Academies Press.

National Visitor Use Monitoring (NVUM). 2015. Visitor Use Report, San Juan NF, USDA Forest Service Region 2 National Visitor Use Monitoring Data collected FY 2011. United States Department of Agriculture.

Olsen, Brett E. 1999. Grazing and Weeds in Biology and Management of Noxious RangelandWeeds. Oregon State University Press, Corvallis.

Onderka, D.K. and W.D. Wishart. 1984. A major bighorn sheep die-off from pneumonia in southern Alberta. Proc. Bienn. Symp. North. Wild Sheep and Goat Counc. 4:356-363.

Orr, H.K. 1975. Recovery from soil compaction on bluegrass range in the Black Hills.

Paulsen, Harold A. Jr. 1960. Plant Cover and Forage Use of Alpine Sheep Ranges in the Central Rocky Mountains.

Platts, W. S. 1981. Sheep and Streams. Rangelands 3(4).

Platts, W. S. 1991. Livestock Grazing. Pages 389-423 *in* Meehan, W. R. 1991. Influences of Forest and Rangeland Management on Salmonid Fishes and their Habitats. American Fisheries Society Special Publication 19. Bathesda, Md. 251pp.

Prichard, Don. 1998. A User Guide to Assessing Proper Functioning Condition and Supporting Science for Lotic Areas. BLM Technical Reference 1737-15.

Prichard, Don. 2003. A User Guide to Assessing Proper Functioning Condition and Supporting Science for Lentic Areas. BLM Technical Reference 1737-16. 1999, revised 2003.

Public Law 104-19. 1995. Rescissions Act.

Public Law 86-517. 1960. Multiple Use Sustained Yield Act.

Public Law 88-577. 1964. The Wilderness Act.
Public Law 91-190. 1970. The National Environmental Policy Act of 1969, as amended.
Public Law 93-205. 1973. The Endangered Species Act of 1973, as amended.
Public Law 94-588. 1976. National Forest Management Act.
Raby, Kim and Williams, Mark. 2005. New Tools for Evaluating Alpine and Subalpine Sensitivity and Water Quality in the Upper Animas Watershed, San Juan County, Colorado. University of Colorado at Boulder, Institute of Arctic and Alpine Research. MSI Project Number 1540651.
Raby, Kim S. 2005. Use of Water Quality Data for Land Management Decisions: A Case Study in San Juan County, Colorado. University of Colorado.
Redders, Jeffery. 2009 Silverton Range Landscape Biological Evaluation for Plants. On file at Columbine Ranger District, Bayfield, CO.
Rowe, H.I., E.T. Bartlett and L.E. Swanson, Jr. 2001. Ranching Motivations in Two Colorado Counties. Journal of Range Management 54(4):314-321.
Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires. 2000. The scientific basis for lynx conservation: qualified insights. Pages 443-454 in Ruggiero, L.F., K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires. (Tech. Eds.). Ecology and conservation of lynx in the United States. Univ. Press of Colorado. Boulder, CO. 480 pp.
Schommer, T., and M. Woolever. 2001. A process for finding management solutions to the incompatibility between domestic and bighorn sheep. USDA Forest Service, Washington, DC. 62 pp.
Schultz, Chris, and Clay Kampf. 2014. Biological Assessment for Federally Listed Terrestrial and Aquatic Species for Weminuche Landscape Grazing Analysis. Columbine Ranger District. 77pp.
Schultz, Chrism and Clay Kampf. 2015a. Supplemental Biological Assessment for Federally Listed Terrestrial and Aquatic Species for Weminuche Landscape Grazing Analysis. Columbine Ranger District. 25pp.
Schultz, Chris. 2015b. Biological Evaluation for U.S. Forest Service Designated Sensitive Terrestrial Wildlife Species for Weminuche Landscape Grazing Analysis. Columbine Ranger District. 78pp.
Schultz, Chris. 2015c. Wildlife Review for San Juan National Forest Terrestrial Wildlife Management Indicator Species for Weminuche Landscape Grazing Analysis. Columbine Ranger District. 26pp.
Schultz, Chris. 2015d. Wildlife Review for Migratory Birds for Weminuche Landscape Grazing Analysis. Columbine Ranger District. 20 pp.
Schultz, Chris. 2015e. Assessment of Risk of Physical Contact Between Rocky Mountain Bighorn Sheep and Domestic Sheep in the Weminuche Grazing Analysis Landscape. Columbine Ranger District. 177 pp.
Sells, S. N, et.al. 2015. Modeling risk of pneumonia epizootics in bighorn sheep. Journal of Wildlife Management 79:195-210.
Shannon, J. M., et.al 2014. Population response of reintroduced bighorn sheep after observed commingling with domestic sheep. European Journal of Wildlife Research 60:737-748.
SJNF. 1984. San Juan National Forest Wilderness Acid Deposition Lake Surveys. Field data on file at San Juan National Forest, Durango, CO.
SJNF. 1992. San Juan National Forest Land and Resources Management Plan, as Amended. USDA Forest Service Rocky Mountain Region.

SJNF. 1998. Wilderness Management Direction Amending the Land and Resource Management Plan. USDA Forest Service Rocky Mountain Region.

SJNF. 2005a. Abert's squirrel species assessment, San Juan National Forest. Unpublished document on file at the Durango Public Lands Center, Durango, CO. 18 pp.

SJNF. 2005b. American elk species assessment, San Juan National Forest. Unpublished document on file at the Durango Public Lands Center, Durango, CO. 20 pp.

SJNF. 2005c. American marten species assessment, San Juan National Forest. Unpublished document on file at the Durango Public Lands Center, Durango, CO. 19 pp.

SJNF. 2005d. Hairy woodpecker species assessment, San Juan National Forest. Unpublished document on file at the Durango Public Lands Center, Durango, CO. 24 pp.

SJNF. 2008. Standard Range Rescission Strategy for Cultural Resources. USDA Forest Service Rocky Mountain Region, San Juan National Forest.

SJNF. 2009. Environmental Assessment and Decision Notice for Silverton Landscape Grazing Analysis. USDA Forest Service, San Juan National Forest, Durango, CO.

SJNF. 2012. Environmental Assessment for the Management and Control of Noxious Plants on the San Juan/Rio Grande National Forests. USDA Forest Service, Durango, CO and Monte Vista, CO.

SJNF. 2013. Final San Juan National Forest and Proposed Tres Rios Field Office Land and Resource Management Plan. USDA Rocky Mountain Region.

SJNF. 2013b. Risk Assessment and Viability Analysis for Rocky Mountain Bighorn Sheep on the San Juan National Forest. Aug. 21, 2013. SJNF, Durango, CO. 65pp.

Smith, D.W. 1967. Effects of cattle grazing on a ponderosa pine-bunchgrass range in Colorado. Technical Bulletin 1371. U.S. Department of Agriculture, Washington, DC.

Southwick Associates. 2014. The Economic Contributions of Outdoor Recreation in Colorado: A regional and county-level analysis. A report prepared for Colorado Parks & Wildlife, Denver, CO.

Srikumaran, Subramaniam. 2011. Letter regarding an update on the development of a vaccine against pneumonia for use in bighorn sheep in the field. To Gray Thornton, President and CEO, Wild Sheep Foundation. October 11, 2011.

Stoddart, Laurence A., Arthur D. Smith, and Thadis W. Box. 1975. Range Management: Third Edition. McGraw-Hill, Inc.

Subramaniam, R., S. Shanthalingam, J. Bavananthasivam, A. Kugadas, K. A. Potter, W. J. Foreyt, D. C. Hodgins, P. E. Shewen, G. M. Barrington, D. P. Knowles, and S. Srikumaran. 2011. A multivalent *Mannheimia-Bibersteinia* vaccine protects bighorn sheep against *Mannheimia haemolytica* challenge. Clinical and Vaccine Immunology 18:1689-1694.

The Wildlife Society (TWS). 2015. The Wildlife Society & American Association of Wildlife Veterinarians joint issue statement, domestic sheep and goats disease transmission risk to wild sheep, approved March 8, 2015. Available on the internet at: *http://wildlife.org/wp-content/uploads/2015/03/WS-DS_DiseaseTransmission_TWSAAWV _JointStatement_APPROVED.pdf*

Towry, R.K. 1984. Wildlife habitat requirements. Pages 174-177 *in* Hoover, R.L., and D.L. Wills eds. Managing forested stands for wildlife. Colorado Division of Wildlife in cooperation with USDA Forest Service, Rocky Mountain Region Denver, CO.

Tranel, J. E., R. L. Sharp, J. Deering, and N. Dalsted. 2013. Lease Rates for Privately Owned, Non-Irrigated Pasture for 2013. Agriculture & Business Management, Colorado State University Extension and the Department of Agricultural and Resource Economics, Fort Collins, CO.

USAHA Joint Working Group. 2009. Recommendations on best management practices for domestic sheep grazing on public land ranges shared with bighorn sheep. United States Animal Health Association Joint Working Group, Committee of Wildlife Diseases & Committee on Sheep and Goats, October 2009. Available on the internet at: *http://www.bighornsheep.org/article_USAHA%20Joint%20Working%20Group%20FINAL2_091109.pdf*

U.S. Department of Commerce. 1927. United States Census of Agriculture - 1925. Bureau of the Census. United States Government Printing Office, Washington.

U.S. Department of Commerce. 1946. United States Census of Agriculture - 1945. Bureau of the Census. United States Government Printing Office, Washington.

U.S. Department of Commerce. 2014. Bureau of Economic Analysis, Regional Economic Accounts, Washington, D.C. Tables CA05, CA05N, CA25N and CA30.

U.S. Department of Labor. 2014. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, Washington, D.C.

University of Wyoming. 2003. The Role of Agriculture in Maintaining Open Spaces in Wyoming. Wyoming Open Spaces, September 2003. B-1141.

US Census Bureau. 2000. Profile of General Demographic and Select Economic Characteristics: 2000, Montrose County, Colorado.

USDA, Economic Research Service (USDA-ERS). 2014. Food Availability (Per Capita) Data System (FADS), Washington, D.C. Available at: *http://www.ers.usda.gov/data-products/food-availability-(per-capita)-data-system.aspx*

USDA, Economic Research Service (USDA-ERS). 2015. Livestock, Dairy, and Poultry Outlook No. (LDPM-247) 21 pp, January 2015.

USDA, Economic Research Service (USDA-ERS). 2015. USDA Agricultural Projections No. (OCE-141) 97 pp, February 2015.

USDA, Forest Service. 1954. Management – San Juan annual report, Durango, April 29, 1954, Colorado State Game Department figures on mountain sheep population, Paul G. Lundell, Assistant Forest Supervisor. Unpublished Report, 1 pp.

USDA, Forest Service. 1961. General Soil Map. San Juan National Forest.

USDA, Forest Service. 1996. Rangeland Analysis and Management Training Guide. Rocky Mountain Region, US Forest Service.

USDA, Forest Service. 2010a. Record of Decision for the: Final Supplemental Environmental Impact Statement and forest plan amendment identifying suitable rangeland for domestic sheep and goat grazing to maintain habitat for viable bighorn sheep populations. Supplemented July 2010. Payette National Forest, 800 West Lakeside Ave, McCall, ID 83638. 38 pp. Available on the internet at: *http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5238683.pdf*

USDA, Forest Service. 2011. Watershed Condition Framework. A Framework for Assessing and Tracking Changes to Watershed Condition. USDA Forest Service SF-977. May 2011. Online at: *www.fs.fed.us/publications/watershed*

USDA, Forest Service. 2011b. Bighorn Sheep Analysis for NEPA Documents. Letter to Regional Foresters. Joel D. Holtrop, Deputy Chief, Washington Office, August 19, 2011.

USDA, Forest Service. 2011c. Bighorn Sheep Analysis for NEPA Documents. Letter to Forest Supervisors. Glenn Casamassa, Acting Deputy Regional Forester, Rocky Mountain Regional Office. September 14, 2011.

USDA, Forest Service. 2012. National Best Management Practices for Water Quality Management on National Forest System Lands. Volume 1: National Core BMP Technical Guide. FS-990a. 105pp.

USDA, Forest Service. 2012b. Bighorn Sheep Analysis for NEPA Documents. Letter to Regional Foresters. Leslie Weldon, Deputy Chief, Washington Office. June 11, 2012.

USDA, Forest Service. 2013. Bighorn sheep risk of contact tool users guide. USDA Forest Service, Intermountain Region, January 2013. Unpublished Document, prepared by USDA Forest Service Bighorn Sheep Working Group, and Critigen, Inc. 76 pp.

USDA Forest Service. 2014. Water Developments at Springs on National Forest System Lands-Considerations for Design, Construction, Maintenance and Restoration.

USDA, Forest Service. 2014b. Bighorn Sheep Analysis for NEPA Documents. Letter to Regional Foresters. Leslie Weldon, Deputy Chief, Washington Office. July 31, 2014.

USDA, Forest Service. 2014c. Bighorn Sheep Analysis for NEPA Documents. Letter to Forest Supervisors. Jacqueline Buchanan, Regional Director of Renewable Resources. August 29, 2014.

USDA, Forest Service. 2015. Region 2 Regional Forester's Sensitive Species List. FSM R2 Supplement 2600-2015-1. August 14, 2015.USDA, National Agricultural Statistics Service (USDA-NASS). 2011. Overview of the United States Sheep and Goat Industry. Agricultural Statistics Board, United States Department of Agriculture.

USDA, National Agricultural Statistics Service (USDA-NASS). 2014. 2012 Census of Agriculture Colorado State and County Data. Volume 1, Geographic Area Series, Part 6, AC-12-A-6. United States Department of Agriculture.

USDA, National Agricultural Statistics Service (USDA-NASS). 2014b. 2012 Census of Agriculture County Profile – La Plata County, Colorado. United States Department of Agriculture.

USDI, Fish and Wildlife Service. 2003. Endangered and threatened wildlife and plants; 90-day finding for a petition to list as endangered or threatened the contiguous United States population of the North American wolverine. Fed. Reg. 68:60112-60115.

USDI, Fish and Wildlife Service. 2013. Biological Opinion for the Land and Resource Management Plan Revision 2013, and Oil and gas Leasing Availability Decision. Letter from USDI Fish and Wildlife Service, Denver, CO, BO TAILS 06E24100-2013-F-0133. Aug. 2013.

USDI, Fish and Wildlife Service. 2013b. Endangered and threatened wildlife and plants; threatened status for the district population segment of the North American wolverine occurring in the contiguous United States; establishment of a nonessential experimental population of the North American wolverine in Colorado, Wyoming and New Mexico; proposed rules. Fed. Reg. 78:7864-7890.

USDI, Fish and Wildlife Service. 2015. Unit Species List of Federally Threatened, Endangered, and Candidate species for the San Juan National Forest, March 25, 2015. Email from USDI Fish and Wildlife Service, Grand Junction, CO.

USGS. 1995. Ground Water Atlas of the United States. Hydrologic Investigations Atlas 730-C. United States Geological Survey.

WAFWA. 2012. Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat. Wild Sheep Working Group, Western Association of Fish and Wildlife Agencies

Wait, S. 2007. Personal Communication. Notes from phone conversation with Scott Wait on February 14, 2007. Regional Terrestrial Biologist, Colorado Division of Wildlife, Southwest Regional Office, Durango, CO.

Wear, David N. 2011. Forecasts of county-level land uses under three future scenarios: a technical document supporting the Forest Service 2010 RPA Assessment. Gen.Tech.Rep. SRS-141. Asheville, NC: USDA Forest Service, Southern Research Station. 41 pp.

Wehausen, J. D., S. T. Kelley, and R.R. Ramey II. 2011. Domestic sheep, bighorn sheep, and respiratory disease: a review of experimental evidence. California Fish and Game 97:7-24.

Weinmeister, B. 2012. Bighorn sheep management plan, data analysis unit RBS-20, Weminuche Herd. game management units S15 (Sheep Mountain), S16 (Cimarrona Peak), S28 (Vallecito). Colorado Parks and Wildlife. 67 pp. Available on the internet at: *http://cpw.state.co.us/Documents/Hunting/ BigGame/DAU/BighornSheep/RBS20DAUPlan.pdf*

Weinmeister, Brad. Personal communications with Brad Weinmeister, Terrestrial Biologist, Durango Area Office, Colorado Department of Parks and Wildlife, Durango, CO.

Western Water Assessment. 2008. Climate Change in Colorado. A Synthesis to Support Water Resources Management and Adaptation. A report by the Western Water Assessment for the Colorado Water Conservation Board. 52 pp.

Whitmer, Jared. 2011. Weminuche Landscape Allotment Histories. Columbine Ranger District. 18pp.

Winternitz, B.L. 1976. Temporal change and habitat preference of some montane breeding birds. Condor 78:383-393.

Wildrose Appraisal Inc. 2014. 2014 La Plata County Property Assessment Study. Wildrose Appraisal Inc. – Audit Division.

Young, M.K. (2008, October 10). Colorado River Cutthroat Trout (*Oncorhynchus clarkii pleuriticus*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region.